WORKFORCE INVESTMENT BOARD OF VENTURA COUNTY

CLEAN/GREEN COMMITTEE MEETING

Friday, July 25, 2014
8:00 a.m. - 9:30 a.m.

Ventura County Community Foundation (VCCF) Nonprofit Center
4001 Mission Oaks Blvd., (Board Room), Camarillo

AGENDA

8:00 a.m.	**1.0 Call to Order and Agenda Review**	Victor Dollar
8:02 a.m.	**2.0 Public Comments** Procedure: The public is welcome to comment. All comments not related to items on the agenda may be made at the beginning of the meeting only.	Victor Dollar
8:05 a.m.	**3.0 Approval of Minutes:** June 06, 2014	Victor Dollar
8:06 a.m.	**4.0 Ventura County Regional Strategic Workforce Development Plan** • Infrastructure Work Group	Dave Fleisch
8:25 a.m.	**5.0 2013-2014 Year End Review**	Cheryl Moore
	6.0 Ventura County Regional Strategic Workforce Development Plan (Continued)	
8:45 a.m.	• Services Work Group	Teresa Johnson
9:00 a.m.	• Certifications: Inventory	Patricia Duffy
9:05 a.m.	• Internships: North-Central Alabama Model	Margaret Lau
9:15 a.m.	**7.0 Spotlight: Southwest Regional Water Conversation**	Margaret Lau
9:25 a.m.	**8.0 Committee Member Comments**	Committee Members
9:30 a.m.	**9.0 Adjournment**	Victor Dollar

Next Meeting
September 26, 2014 (8:00 a.m.-9:30 a.m.)
Ventura County Community Foundation (VCCF) Nonprofit Center
4001 Mission Oaks Blvd. (Community Room), Camarillo

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WORKFORCE INVESTMENT BOARD VENTURA COUNTY

WIB Clean/Green Committee Meeting
June 6, 2014

MINUTES

Meeting Attendees

Committee	WIB Staff	Guests
Kimberly Nilsson, Acting Chair*	Patricia Duffy	Eric Humel (Oxnard City Corps)
John Brooks	Cheryl Moore	Brad Hudson (Office of Congresswomen Julia Brownley)
F. Paul Chounet		
Rebekah Evans		
Dave Fleisch		
Paul Grossgold		
Margaret Lau		
Wayne Pendrey		
Sharon Woolley		

**WIB Members*

1.0 Call to Order

Kimberly Nilsson called the meeting to order at 8:05 a.m. No changes were made to the agenda.

2.0 Public Comments

No comments

3.0 Approval of Minutes: April 25, 2014

Motion to approve: David Fleisch
Second: John Brooks
Abstain: Paul Grossgold
Motion carried

4.0 Green Certifications

John Brooks reported on the working draft of the Recommended Environmental Programs "Green" Certification List. Committee members expressed their appreciation to Mr. Brooks for initiating the inventory process and discussed ways to research and add a wide range of content in a user-friendly, flexible format. Included would be identifying the value of a certification as it relates to the industry job. Consideration would be given to classifying the industry certifications into three or more categories; 1) Required Certification 2) Desired Certification or 3) Other. As the certification list is developed, the Committee agreed to seek industry validation of the document and perspective on the business value of the certifications.

5.0 Ventura County Regional Strategic Workforce Development Plan (Plan)

- Infrastructure Work Group: The Infrastructure Work Group will report at the next meeting.
- Services Work Group: Rebekah Evans reported on the group's recent work to develop a draft of readiness skills for the hospitality industry. She also discussed the Ventura County Lodging Association efforts to encourage hotels to go green and also support hospitality education.

- Considerations for Next Steps

  - Change the term "soft skills" to "essential skills" (attached). Align and create common essential skills list across multiple industry sectors

  - Connect employer needs with education.

  - Get feedback from employers on industry credentials

  - Become a community voice through outreach to Chambers of Commerce, school boards and economics classes.

  - Determine how to connect teachers to businesses for first hand experience. Consider externships for teachers.

  - Obtain information the Virginia model of apprenticeships.

  - Work on identifying green apprenticeship programs.

  - Find ways to connect with the Career Pathways Trust grants and continue to contribute and share the work of the committee.

6.0 Oregon's Career Pathways

Patricia Duffy introduced a useful website established by the State of Oregon Community Colleges and Workforce Development: "Oregon Green Career Pathways" at www.oregongreenpathways.org. Committee members were encouraged to visit the website, which defines specific occupations and skills required. Each career path provides information on the local courses, certificates, and degrees available at the community colleges, as well as apprenticeship programs.

7.0 Calendar

Committee members decided to meet every other month, to allow more time for the work groups to work between meetings.

8.0 Committee Member Comments

Wayne Pendrey announced that the Center for Employment Training would be adding three new classes and asked the committee for recommendations.

9.0 Adjournment

The Committee adjourned at 9:35 a.m.

Next Meeting
Friday, July 25, 2014 (8:00 – 9:30 a.m.)
Ventura County Community Foundation (VCCF) Nonprofit Center
4001 Mission Oaks Blvd. (Board Room), Camarillo

2013-2014 YEAR-END REVIEW
Workforce Investment Board of Ventura County

CLEAN/GREEN COMMITTEE

2013-2014 Members

WIB Members: Victor Dollar (Chair), Nancy Williams (Vice Chair), Rodney Cobos, Teresa Johnson, Kimberly Nilsson

Other Members: John Brooks (City of Thousand Oaks), F. Paul Chounet (Santa Paula Unified School District), Diane de Mailly (DDM Metering Systems, Inc.), Rebekah Evans (Ventura County Lodging Association), David Fleisch (County of Ventura Public Works Agency), Paul Grossgold (County of Ventura General Services Agency), George Kopf (BPI/NREL Home Energy Professional Energy Auditor), Margaret Lau (Deputy Sector Navigator, South Central Region of California Community Colleges), Valeria Makarova (California Lutheran University), Tiffany Morse (Ventura County Office of Education), Wayne Pendrey (Ventura County Contractors Association), Teresa Telles (Center for Employment Training), Sharon Woolley (Ventura County Community College District)

Committee Accomplishments

In support of the WIB's *Ventura County Regional Strategic Workforce Development Plan 2013-2017,* and in alignment with the California WIB Green Collar Jobs Council and the current California definition of clean/green, Committee members:

- Determined key components of the clean/green sector strategy and developed a two-year action plan for the committee in three categories: partners, skills and education, and regional engagement.
- Discussed a review of academic literature regarding how to define green jobs.
- Developed, discussed, and refined the WIB's Ventura County Occupational Employment Data and Growth Projections: Clean Green. Used the chart as a working tool to identify jobs, wages, employment growth projections, growth/replacement job potential, and priorities for workforce education and training. Posted the information on the WIB website for easy public access.
- Discussed and contributed to the development of the clean/green components of the K-14 Industry Sector Pathways (Ventura County Office of Education) inventory of career readiness programs, certificates, credentials, and apprenticeships. Converted the document to Excel to facilitate data sorting and posted both versions on the WIB website.
- Identified major clean/green career categories for Ventura County (Infrastructure, Services, Manufacturing, Business, and Agriculture) and formed two initial workgroups: Infrastructure and Services. Project status as of June 30, 2014:
  - Clean/Green Infrastructure Readiness Skill Categories: completed and ready for distribution to education for integration into the curriculum
  - Clean/Green Readiness: Essential Skills Categories: almost ready for distribution and integration (will serve as an overview of important basic skills/attributes that apply across different types and levels of clean/green jobs)
  - Hotel and Hospitality Skills Categories: in development

2013-2014 YEAR-END REVIEW
Workforce Investment Board of Ventura County

CLEAN/GREEN COMMITTEE

Committee Accomplishments (Continued)

- Provided research, planning, collaboration, and facilitation of work which helped to create a foundation in support of economic plans, community workforce development initiatives, and grant applications (including two Career Pathways Trust education grants awarded in Ventura County).
- Discussed the importance of engaging more local employers in sustainability practices—a significant culture change which would, in turn, increase the demand for clean/green-related skills, jobs, and services.
- Developed outreach content (elevator speech) for Committee members to use/adapt in communicating the purpose and direction of the WIB and Clean/Green Committee.
- Invited leaders of clean/green-related businesses, agencies, and educational programs to make presentations to the Committee and/or join the group.
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Insights

(Ideas from Committee meeting notes)

- *Adding labor union programs, internships, apprenticeships, higher education programs, and employer training information to the K-14 Industry Sector Pathways inventory will provide helpful insight.*
- *We need to identify local employer certification requirements for clean/green jobs.*
- *We need to find ways to develop region-wide understanding of sustainability as part of "foundational education" (e.g., build into finance, IT, marketing) for all to be competitive, innovative, adaptable, and flexible.*
- *Businesses need to see a value/return for investing in internships.*
- *Re-skilling and up-skilling are big issues for succession planning and back-filling.*
- *Mature workers need access to training in the "new basics," and employers need incentives to hire mature workers.*
- *We need to convene a "cross-sector" meeting to help align and leverage the work of the WIB sector committees (Clean/Green, Healthcare, Manufacturing).*
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Clean/Green Committee 2-Year Plan
Workforce Investment Board of Ventura County

Goal: Develop a pipeline of skilled workers in clean/green occupations to address the workforce needs of employers, working in collaboration with business, economic development, education, labor, government, and community-based organizations.

Focus Areas: Infrastructure, Services, Manufacturing, Business, Agriculture

Action Plan:

1) Engage a core team of Ventura County employers, agencies, education, labor and other organizations most involved in clean/green workforce development:

   - Recycling/reuse
   - Energy efficiency
   - Natural and sustainable product manufacturing
   - Renewable energy
   - Water conservation
   - Ventura County Office of Education
   - Adult education
   - Ventura County Community College District
   - California Lutheran University
   - California State University, Channel Islands
   - Others

2) Develop ways to identify, engage, and communicate effectively with the core team and other clean/green workforce partners.

3) Conduct annual research to evaluate clean/green workforce needs and changes.

4) Inventory current training providers in the region.

   - Certification programs
   - Apprenticeships
   - Pre-work experience
   - High school academies
   - Regional Occupational Program
   - Adult school programs
   - Community colleges
   - Universities

5) Determine focus area priorities for clean/green workforce development.

   - Sector workforce readiness
   - Career pathways
   - Sector certifications
   - Stackable credentials
   - Pre-apprenticeship and apprenticeship programs
   - Business participation:
     - Curriculum development
     - Job shadowing
     - Internships
     - On-the-job training
     - Career awareness/outreach

6) Identify key gaps between education and clean/green workforce development needs.

7) Consider ways to raise employer awareness and participation in green business practices and certifications.

8) Develop an action plan to bridge those gaps. Establish a timeline and benchmarks that can monitor the progress of the Clean/Green Committee.

California's current definition of clean/green: recycling/reuse; energy efficiency (product manufacturing and distribution, construction, installation and maintenance, transportation); natural and sustainable product manufacturing; renewable energy; compliance; education and awareness; water conservation

CLEAN/GREEN INFRASTRUCTURE READINESS SKILL CATEGORIES

Workforce Investment Board of Ventura County

SAFETY	MATH CONCEPTS	MEASUREMENTS	HAND AND POWER TOOLS
• General workplace safety • Electrical safety including Lock-out/Tag-out procedures • Worker safety • Equipment safety • Climbing/ladder safety • Power tool safety • Safety data sheets • OSHA10 • First aid/CPR/AED	• Addition and subtraction of fractions • Combined operations of fractions and mixed numbers • Algebraic operations of addition, subtraction and multiplication • Ratios and proportions • Table of decimal equivalents and combined operations of decimals • Degree of precision, tolerance and clearances	• Standards • Units of measurement • Tape measure use • Measuring for cutting materials • Basic layout (surveying) • Mass and weight measurement • Measuring fluids • Measuring solid materials (sand, cement, etc.)	• Tape measures, squares and levels • Basic hand tools – saws, hammers, screw drivers, wrenches • Power tools – saws, drills, screwdrivers • Pneumatic drills and nail guns • Powder actuated tools • Laser equipment

SUSTAINABILITY AND QUALITY	BLUEPRINT CONCEPTS	SOFT SKILLS	COMPUTER SKILLS

• Sustainable work processes:
  ○ Conservation
  ○ Reuse
  ○ Recycle
  ○ Repurpose
  ○ Reduce
  ○ Economy of use/right-sizing
• Importance of individual – do it right the first time
• Continuous process improvement for green purposes
	• Introduction basic construction drawings
	• Basic blueprint reading
	• Understanding different drawing types:
	  ○ Civil
	  ○ Electrical
	  ○ Mechanical
	  ○ Repair/renovation
	  ○ New construction
		• Basics of interviewing
		• Work ethic
		• Oral communication
		• Written communication
		• Time management
		• Task prioritization
		• Worker, supervisor, manager etiquette and protocol basics
		• Basic company policy understanding
			• Excel
			• Word
			• OS basics
			• Computer navigation
			• Computer security
			• Computer etiquette
			• Viewer basics, PDF, CAD, jpg, png, bmp, TIFF, Solid Works, etc.
			• File extension basics

CLEAN/GREEN READINESS: ESSENTIAL SKILLS CATEGORIES

Workforce Investment Board of Ventura County

BASICS OF QUALITY CONTROL	SOFT SKILLS	COMPUTER SKILLS
• Know processes, as applicable, per business • Basic quality methodology and inspection techniques • Importance of individual responsibility – to do it right the first time • Manufacturing theory and quality control • Lean manufacturing and quality control • Knowledge of regulations and systems processes • Knowledge of waste management – waste reduction advantages • Certification and best practices	• Initiative • Basics of interviewing • Work ethic • Communication skills • Continuous improvement skills • Basic company policy understanding • Time management • Task prioritization • Worker, supervisor, manager etiquette and protocol basics • Opportunities for work experience – applications of skills in work settings • Apprenticeships- knowledge sustainable career pathways and paid training opportunities	• Microsoft Excel • Microsoft Word • Microsoft Access • Operating System basics • Computer navigation • Computer security • Computer etiquette • ERP basics • Viewer basics like PDF, CAD, jpg, png, bmp, TIFF, Solid Works, etc. • File extension basics • Basic programming

The hospitality industry—a partner with much to offer

If you want to be a professional in a career with a rewarding, high-growth environment allowing multiple career paths, the hotel & hospitality industry has the ability to fill your need. Within the hotel industry, you can obtain consistent increase in skills and experience as one of the largest and fastest-growing industries in the world.

Ventura County Hotel & Hospitality Skills & beliefs for professionals:

Soft Skills:

- Initiative
- Work ethic
- Basics of interviewing
- Communication Skills
- Continuous improvement skills
- Basic company policy understanding
- Time management
- Task prioritization
- Hospitality & Lodging development & planning
- Worker, supervisor, manager etiquette and protocol basics
- Opportunities for work experience—applications of skills in work settings
- Apprenticeships—knowledge of career pathways and paid training opportunities
- General math skills
- General reading skills

Basics of Quality Control:

- Know processes, as applicable per job function
- Basic quality methodology of each job function
- Importance of individual responsibility—do it right the first time
- Hotel & Hospitality theory and quality control
- Knowledge of system processes
- Knowledge of 'clean-green' processes
- Cost Control/ Purchasing

Computer Skills:

- Microsoft Word
- Microsoft Excel
- Operating system basics
- Computer navigation
- Computer etiquette
- Computer security

Lodging skills:

- Safety & Security
- Hotel Facilities & Management
- HR/Law skills
- Food Management/ Catering
- Accounting
- Guest Service/ Guest cycle
- Front desk operations
- Reservations/registration/check out & settlement
- Housekeeping Management

Sales & Marketing:

- Hospitality Sales Marketing/ Social Media Marketing/ Telephone Sales
- Catering & Meeting Room Sales
- Advertising & Public Relations

Food & Beverage Service

- Hotels/Food Beverage Service
- Menu/ Dining & Beverage Service
- Event Planning/ Bridal Event Planning
- Sanitation, Health & Safety

Hospitality relates to:

Accommodations-Hotels, motels, resorts, hostels, vacation rentals, vacation ownership, Bed & Breakfast properties, recreational vehicles, camping

Food & Beverage-Restaurants, full-service, fine dining, quick service, banquet facilities, lounges

Transportation—Airlines, cruise lines, rail, car rentals, tour/coach operators, bus lines, taxis

Attractions—Theme parks, zoos, national/state/local parks, natural wonders, heritage sites.

Tourism /Destination – Convention Visitors Bureaus, State Travel Groups, Chambers of Commerce.

Co-Operation to Meet Workforce Needs

In mid-2006, Calhoun Community College and area manufacturing companies realized that they were both dealing with problems that could best be solved through a mutual partnership.

- There is a future shortage of skilled workers to fill key positions within manufacturing and process industry organizations located in North-Central Alabama.
- Calhoun's Technology program enrollments and number of graduates are insufficient to meet workforce demands for these key positions.
- There has typically been a "single-channel" college recruitment program that has not brought industry to explain their workforce needs and the tremendous career opportunities that are available.

The Co-operation Program is a joint venture among regional manufacturing companies, Calhoun Community College, and students pursuing post secondary degrees and employment in aerospace technology, machining, and process technology. The Program is unique in that 14+ companies, four economic development agencies, and three college programs are collaborating to develop and implement a ***joint*** cooperative education agreement. This industry-led initiative includes high school recruitment activities and establishing applicant eligibility requirements, cooperative student wages, and end-of-program hiring procedures. The intent is to not only address company-specific workforce shortages but also to "raise the bar" in ***overall*** regional manufacturing workforce capabilities.

The objective of this initiative has been to develop a process to fill and maintain a "full pipeline" of educated/trained people to fill key technical positions within North-Central Alabama manufacturing organizations and to increase industry participation with the curriculum content and the cooperative student (co-op) marketing process. Students in the Co-operation program would be able to work 20 to 25 hours per week in their field of study while attending school full time. Work assignments will become increasingly more challenging as students gain experience and more technical skills, and pay increases are awarded based on satisfactory performance evaluations at the end of each semester.

Through the first half of 2007, Calhoun and these innovative companies worked to develop a common understanding of the program process addressing eligibility, application, selection, work schedules, pay and performance appraisals. An application process was designed with interviews and selections made by the respective companies.

For each selected student, a three-party agreement is signed by the company, the student, and the College. In fall semester of 2007, twenty four students entered the Co-Operation program, fourteen in Aerospace/Machine Tool Technology and seven in Process Technology. They will be extended the opportunity of employment once the training program is complete. While companies do not guarantee employment at the end of the Co-Operation period, it is likely that with good work and academic performance, students will have great employment opportunities.

Industries involved to date are:

Aerospace/Machine Tool	Process Technology
Automatic Screw Machine/ Decatur	3M/Decatur
AZ Technology	BP/Decatur
Falciani Machine/Huntsville	Calpine/Decatur
Dixie Metalcraft/Hazel Green	Solutia/Decatur
Cargill/Decatur	IDMC/Snap-on/Elkmont
United Launch Alliance/ Decatur	Toray/Decatur
Brown Precision/Huntsville	

For more information on the Co-Operation program go to www.calhoun.edu/Techno/Co-operation.index.html or contact Ann Coleman (256-306-2938 or bac@calhoun.edu)

Co-Op applications being reviewed by industry representatives from Automatic Screw Machine, Falciani Machine, ULA, Snap-on Tools, Dixie Metalcraft, and AZ Technology.

DEFINING WATER MANAGEMENT

ATEEC

Advanced Technology
Environmental and Energy Center

Defining Water Management

A Report of the Defining Water Management Forum
January 21 and 22, 2013 in San Diego, CA

The Advanced Technology Environmental and Energy Center (ATEEC) acknowledges and thanks the water technology professionals who generously shared their time and expertise in defining the water management career field. Their professional insights are critical to developing water education and training programs that clarify occupations and meet workforce needs. Without this group, the guidance disseminated in this report would not be possible. The forum participants are listed individually in the Acknowledgments section of this report.

We would also like to express our gratitude to Paul Bishop and Sheena Kennedy from the Association of Boards of Certification (ABC) and Christine Radke from the Water Environment Federation (WEF) for their invaluable assistance in recruiting some of the top water technology professionals in the field from their organizations' memberships to participate in ATEEC's Defining Water Management Forum.

Finally, ATEEC thanks the Advanced Technological Education (ATE) program of the National Science Foundation (NSF) for its support and foresight in recognizing that improvements in water technology education must begin with obtaining a clear picture of what stakeholders need to ensure the water technology workforce adapts to a rapidly changing and increasingly critical field of water management.

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CONTENTS

This project was supported, in part, by the Advanced Technological Education Program at the National Science Foundation. The opinions expressed in this report are those of the forum participants and do not necessarily represent NSF policy.

Additional copies of this report can be downloaded at ATEEC's Web site: www.ateec.org.

INTRODUCTION

THE ISSUES

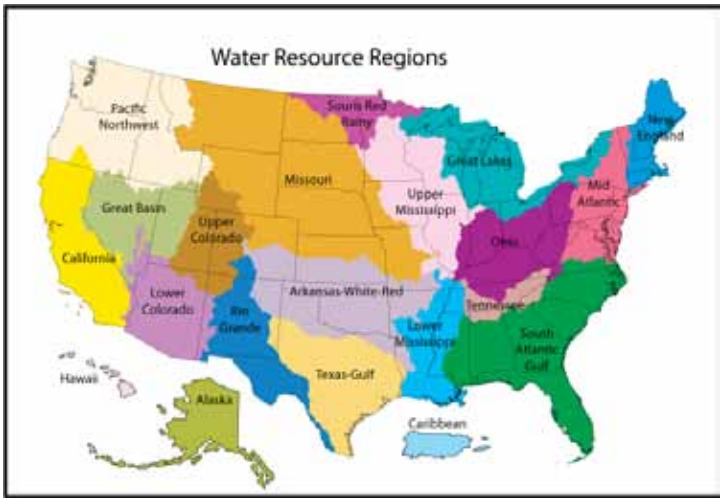
An international freshwater crisis in the foreseeable future will encompass many challenges—water pollution and scarcity; competing urban, rural, and ecosystem water needs; climate change; environmental and public health impacts; resource security; and economic implications.[1] In the United States, due to the impending retirement of current water and wastewater treatment workers, there is a critical need to expand and update water and wastewater environmental programs at the community college level to meet the demands for water quality and conservation in the coming years.

The study of water involves physical, chemical, and biological components and technology programs are needed for biological technicians, environmental technicians, fisheries technicians, hydrologic technicians, water quality technicians, water resources technicians, wastewater technicians, and watershed technicians. In particular, there is an increasing need for technicians in the investigation, interpretation, and analysis of data for proper monitoring and management of water resources. The Association of Boards of Certification promotes certification as a critical means of advancing water quality and integrity, and protecting public health and the environment.[2]

We need to make sure there are enough qualified human resources to resolve current and upcoming water quality issues. We have probably reached the max in terms of "doing more with less" people—we need more human resources at this point.

Ken Kerri, Forum Participant
California State University-Sacramento

There is little doubt that U.S. drinking water and wastewater infrastructures are in dire need of an overhaul, as well as source water quality concerns. The American Water Works Association reports that there are several fundamental concerns including source water availability, aging infrastructure, remediation, and workforce issues.[3] The U.S. Geologic Survey estimates that the U.S. wastes six billion gallons of clean drinking water each day, or 14% of total use, through leaky pipes in need of repair.[4] The American Society of Civil Engineers gave a grade of D- to both the nation's drinking water and wastewater infrastructures.[5] According to the Water Environment Federation, one and a half million miles of pipeline comprise this infrastructure, most of which was built nearly a century ago and is literally falling apart. Most pipelines only have a lifespan of 50 to 100 years and were originally designed for populations half their current size.[6]



References are listed at the end of this section.

A growing population and the increasingly suburban geography of the U.S. are expected to boost demand for water and wastewater treatment services. The EPA estimates that up to 3.5 million Americans fall sick each year from swimming in waters contaminated by sanitary sewer overflows.[7] Water is used in energy resource extraction, refining and processing, and transportation; is an integral part of electric-power generation; is used directly in hydroelectric generation; and is used extensively in cooling and emissions scrubbing in thermoelectric generation. As the U.S. seeks to replace imported petroleum and natural gas with fuels from domestic sources such as biofuels, synfuel from coal, hydrogen, previously inaccessible natural gas, and possibly oil shale, the demand for water to produce energy fuels could grow significantly.[8] The U.S. National Science Foundation (NSF) has recently worked with EPA regarding the protection of water quality in public water systems, remediation of contaminated sites, sediments and groundwater, and restoration of ecosystems.[9]

In 2008, the Johnson Foundation at Wingspread initiated a summit with leaders from business, agriculture, academia, government, foundations, and communities to discuss freshwater issues including the impact of climate change on freshwater resources, infrastructure, agriculture and food production, the water/energy interface, and public health. The forum identified several calls to action, including a recommendation to higher education institutions to address job creation and identify and establish "mechanisms for enhanced coordination of research and policy development efforts, as well as interdisciplinary collaboration among organizations and institutions to advance freshwater solutions." Efficiencies and new sources of water must come from better management, better coordination, more efficient use of the water we have, and additional use of nontraditional or alternative water resources such as wastewater reuse or desalination. This will become the goal for water development in the U.S. in the next 50 years.[10]

INTRODUCTION (cont.)

According to the U.S. Bureau of Labor Statistics (BLS), water and wastewater treatment plant and system operator jobs are expected to grow much faster than average for all occupations. Currently local governments are the largest employers of water and wastewater treatment plant and system operators, but employment in privately owned facilities will grow as federal certification requirements have increased utilities' reliance on private firms specializing in the operation and management of water and wastewater treatment facilities. It is estimated that 25%–50% of the approximately 52,500 wastewater management workers will retire within the next five years.[11] The prospect of losing the expertise acquired over their decades of service is daunting.[12] [13] [14]

A NEXT STEP

On January 20th and 21st in 2013, the Advanced Technology Environmental and Energy Center (ATEEC) conducted a national forum for defining water management, sponsored by the NSF. The forum goal was to definitize and expand upon the categories of water quality and wastewater management from a previous ATEEC report, Defining Environmental Technology.[15] Due to the increasing importance of water issues, NSF tasked ATEEC with performing a more thorough occupational analysis of the water management field. Skill sets traditionally associated with water management are cutting across both traditional and emerging technologies. The advent of new technology, the increased role of water and energy in national security issues, changes in national and regional regulatory compliance requirements, a retiring workforce, and the changing demands of industry call for a realignment of academia, industry, business, and government in order to ensure the efficacy of the U.S. water infrastructure.

The 2013 forum's objectives included the following:

- Title and definition of the field of water management;
- Definition of technician;
- Water management occupational categories;
- Technician-level occupational titles; and
- Job functions typically performed in each occupation.

ATEEC collaborated with the Partnership for Environmental Technology Education (PETE), the Association of Boards of Certification (ABC), and the Water Environment Federation (WEF) to recruit participants for the forum. ATEEC invited experienced practitioners in the water management field who brought to the table a broad perspective of the various occupational areas included in this field. The participants who attended the workshop included business, industry, and government agency representatives. ATEEC attempted to gather as broad a regional representation of the country as possible, a variety of water technology areas, and industries that would employ water technicians.

The audience for this report includes:

- Counselors, advisors, faculty, and administrators of academic institutions at all levels but particularly in two-year colleges and high schools;
- Students, technicians, and employers of technicians (e.g., companies, government agencies);
- Leaders of professional societies; and
- Federal, state, and local government officials responsible for the quality and quantity of the nation's technical workforce.

A primary purpose of this report is to enhance counselor, teacher, and student awareness of the critical nature of water management careers at the technician level. Ultimately, the report should contribute to addressing the workforce development needs of business, industry, and government by providing educators with information needed to better inform students of the professional opportunities and to develop relevant curriculum that prepares students for water management careers.

The report is also being used to provide direction for ATEEC, as an NSF Center of Excellence in the Advanced Technological Education program. The Center brings together institutions from across the nation to promote and assist environmental technology programs, with a special focus on water management. ATEEC's core partners in these efforts are PETE, University of Northern Iowa, and the NSF.

We need to convey to potential students what a valuable and important line of work water can be—not many consider it as a career, but it's a great career path. It's largely immune to external abnormalities and cannot be exported outside the U.S.

Steve Harrison, Forum Participant
Water Environment Federation

INTRODUCTION (cont.)

THE FORUM

The 2013 Defining Forum participants considered these questions:

- What title and definition accurately describe the water management field?
- What definition of "technician" accurately describes the position?
- How would you broadly categorize occupations in the water management field?
- What specific technician-level occupations are typically found in each occupational category?
- What technician-level job functions are typically performed in each occupational category?
- What are the emerging issues and future trends in the water management field?
- What is the role of community colleges in technician education and training?

The forum began on January 20th in San Diego, California. Participants were welcomed and presented with information on ATEEC's mission and goals. The group then reviewed the agenda, objectives, and work processes for the forum. Initial reference materials used to jump start the discussions were ATEEC's Defining Environmental Technology report and the "Water Sector Competency Model"[16] developed by the U.S. Department of Labor, U.S. Environmental Protection Agency, American Water Works Association, and the Water Environment Federation.

To begin the forum process, the first two action items were the participants' discussions of the title and definition of the water management field and the definition of "technician." It was noted that the educational background for technicians in different regions and municipalities can range from a high school diploma plus on-the-job training to advanced degrees. In order to elicit effective information to enable educators to better understand business and industry needs and incorporate them into the curricula, it was agreed to view technicians as having completed a two-year associate degree in an applied technology program. The following definitions were developed.

What is the Water Management field?

Water Management is a career field that applies the principles of science, math, technology, engineering, communication, economics, management, and law to ensure water quality and to sustainably manage water as a resource to protect public health and the environment.

What is a Water Professional?

A Water Professional applies knowledge, skills, and abilities to perform scientific, technical, managerial, regulatory, and communication tasks and responsibilities.

The participants then broke up into small groups, in the category areas where they felt their specific expertise would be of most value. The majority of the small-group work was spent in creating, revising, and refining technician-level job titles and job functions. Many of the occupations developed at this time reflect well-established and well-defined jobs (e.g., electrician, GIS tech, surveyor, customer service representative) that incorporate new water technologies as part of the traditional, existing job functions. Participants felt that while these types of jobs should be listed in the applicable category and are critical to the water management field, it wasn't necessary to list job functions for the purposes of this forum.

Participants also stressed the general observation that many job functions in water/wastewater plants are very dependent on the size of the operation. For example, a water professional's duties in a small operation are highly likely to cross over between these job titles. Similarly, depending on the region or individual plant, knowledge, skills, and functions are often cross-cutting among job titles.

INTRODUCTION (cont.)

THE FORUM (cont.)

The small groups then shared and discussed their specific results with the large group, reaching a large-group forum consensus on the material covered in this report. The remainder of the workshop was spent identifying emerging issues and trends in the water management field.

Following the forum in San Diego, an online discussion site was created for participants to review and spend further time refining the materials they had developed. Additional experts in the field from business, education, and government organizations were then invited to review and comment on the initial documentation from the forum, resulting in a validation and consensus of expert opinions. ATEEC will continue to solicit and update additional occupational data through online input.

THE RESULTS

The next section of this document contains the occupational chart, "What is the Water Management field?," providing a valuable snapshot of a wide-reaching topic area. Included in the chart are the Water Management definition and the Water Professional definition, as well as representative technician-level job titles for each of the occupational categories. Following the chart are more detailed listings of job titles, the majority of which also list the specific job functions developed during the forum.

The last section of the report presents emerging issues and future trends in water management that were identified during the forum. It also provides several recommendations for community college and high school educators to encourage students to consider the field.

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ATEEC

Advanced Technology
Environmental and Energy Center

What is the Water Management field?

Administration

- Customer Service Representative
- Health and Safety Coordinator
- Information Technology (IT) Professional
- Project Manager
- Public Relations and Human Resources Specialist
- Regulatory Compliance Manager
- Security Coordinator

Engineering

- Construction Inspector
- Construction Supervisor
- Corrosion Control Specialist
- Geographic Information Systems (GIS) Specialist
- Hydraulic Specialist
- Hydrology Technician
- Surveyor

Laboratory

- Environmental Sampling/Monitoring Technician
- Instrumentation Technician
- Lab Analysis Technician
- Laboratory Health and Safety Supervisor
- Quality Assurance/ Quality Control (QA/QC) Technician

Plant Maintenance

- High Voltage Electrician
- Low Voltage Electrician
- Plant Maintenance Supervisor
- Plant Maintenance Technician

NSF

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Water Management is a career field that applies the principles of science, math, technology, engineering, communication, economics, management, and law to ensure water quality and to sustainably manage water as a resource to protect public health and the environment.

What is a Water Professional?

A water professional applies knowledge, skills, and abilities to perform scientific, technical, managerial, regulatory, and communication tasks and responsibilities.

Regulations and Compliance

- Biosolids Land Application Technician
- Cross-Connection Control Specialist
- CSO/SSO Monitoring Specialist
- Enforcement Specialist
- Environmental Compliance Technician
- Fats/Oils/Grease (FOG) Manager
- FOG Inspector
- Industrial Pretreatment Specialist
- Large Animal Confinement Inspector
- Permit Specialist
- Pretreatment Manager
- Stormwater Compliance Inspector

Wastewater Operations

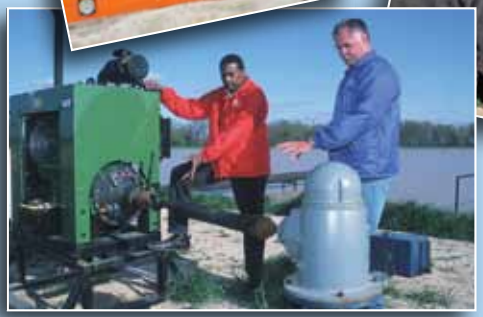
- Chief Operator
- Collection System Operator*
- Industrial Pretreatment Operator
- Instrumentation Technician*
- Plant Operator* (treatment, biosolids, reclamation, construction)
- Pretreatment Coordinator
- Process Control Operator**

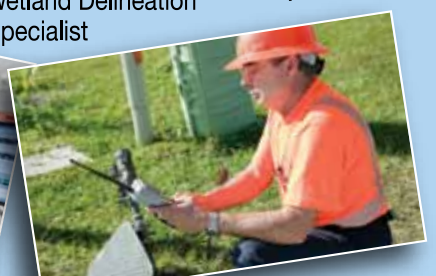
Water Operations

- Cross-Connection Control Specialist
- Distribution Operator/Foreman
- Heavy Equipment Operator
- Industrial Water Systems Operator
- Instrumentation Technician
- Leak Detection Technician
- Meter Reader/Installer
- Meter Tester/Mechanic
- PLC/SCADA Programmer
- Treatment Plant Mechanic
- Utility Locator ("Dig Safe")
- Water Treatment Operator

Watershed and Runoff Control

- Agricultural Water Specialist
- Aquatic Habitat Restoration Technician
- Dredge Operator
- Forestry Technician
- Ground Water Remediation Technician
- Hydrogeology Technician
- Hydrology Technician
- Modeling Technician
- Residential Water Purification Technician
- Septic Tank Maintenance Technician
- Source Water GIS Technician
- Stormwater/MS4 Technician
- Surface Water Monitoring Technician
- Sustainable Landscaper
- Water Conservation Technician
- Well Driller
- Wetland Delineation Specialist





* Various levels (e.g., supervisor, team leader, senior lead, shift supervisor, operator I, operator II, operator III, non-certified maintenance worker, operator-in-training (OIT))

** Various levels (e.g., operator, engineer, supervisor)

OCCUPATIONAL CATEGORIES, TITLES, AND FUNCTIONS

IMPORTANT NOTES: 1) To avoid unnecessary duplication, the following section assumes that all occupations must adhere to all health and safety procedures (including selection and use of proper personal protective equipment) and follow applicable standard operating procedures (SOPs). 2) The following job titles and functions are dependent on system size and scale of operation. Many jobs may be combined and there is often a great deal of crossover of skill sets.

ADMINISTRATION

- Customer Service Representative
- Health and Safety Coordinator
- Information Technology (IT) Professional
- Project Manager
- Public Relations and Human Resources Specialist
- Regulatory Compliance Manager
- Security Coordinator

Customer Service Representative

Health and Safety Coordinator
- Implement and oversee safety program.
- Facilitate health and safety training.
- Enforce health and safety rules and regulations.
- Perform health and safety inspections.

Information Technology (IT) Professional
- Implement efficient IT protocols.
- Generate and maintain effective IT security.
- Manage software and hardware (including servers).

Project Manager
- Explain and apply procurement policy.
- Demonstrate enhanced energy management.
- Coordinate and manage capital projects within a budget.
- Evaluate and implement process improvements.
- Examine contract document and apply to project.

Public Relations/Human Resources Specialist
- Promote a positive image of the company and industry.
- Analyze and interpret public perception of the company and industry.
- Develop a positive media relationship.
- Communicate effective public education and interactions.
- Describe and communicate to others the regulatory and legislative processes.
- Assist in allocation of workforce.
- Investigate and resolve public and employee complaints.

Regulatory Compliance Manager
- Develop and maintain billing software.
- Stay current with legislation and upcoming changes.
- Lobby in the best interests of the industry.
- Prepare reports for local government.
- Develop cost analysis for impending legislation.

Security Coordinator
- Develop and implement security programs.
- Identify and assess critical infrastructure.
- Recommend security measures.
- Prioritize and evaluate security risks.
- Develop Emergency Response Plan.

ENGINEERING

- Construction Inspector
- Construction Supervisor
- Corrosion Control Specialist
- Geographic Information Systems (GIS) Specialist
- Hydraulic Specialist
- Hydrology Technician
- Surveyor

JOB FUNCTIONS

Construction Inspector
- Review construction site management plans.
- Audit construction sites for compliance with erosion control and stormwater runoff management.

Construction Supervisor
- Determine and implement best management methods for erosion control and stormwater runoff on construction sites.
- Ensure compliance with regulatory requirements for potable and non-potable water.
- Ensure safety of construction site workers involved with water issues.
- Ensure protection of the environment from contaminated water found or created on site.

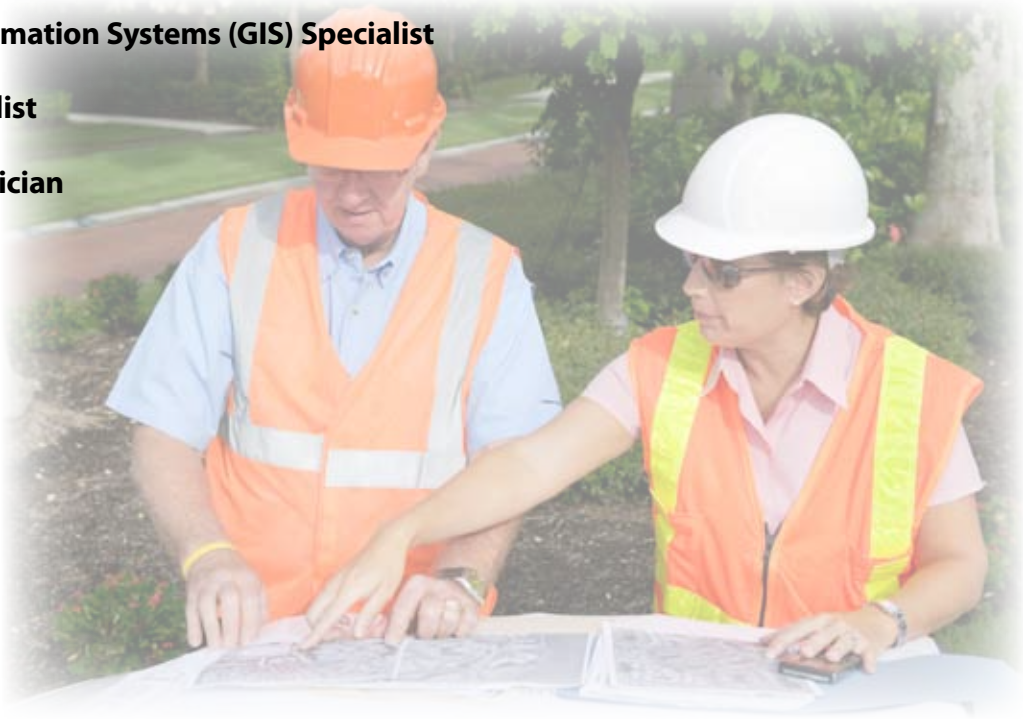
Corrosion Control Specialist

Geographic Information Systems (GIS) Specialist

Hydraulic Specialist

Hydrology Technician

Surveyor



JOB FUNCTIONS

LABORATORY

- **Environmental Sampling/Monitoring Technician**
- **Instrumentation Technician**
- **Lab Analysis Technician**
- **Laboratory Health and Safety Supervisor**
- **Quality Assurance/Quality Control (QA/QC) Technician**

Environmental Sampling/Monitoring Technician

- Collect and preserve samples.
- Calibrate field meters and analysis equipment.
- Perform field analyses.
- Instruct others on proper sample collection, preservation, and analysis.
- Operate field sampling/monitoring equipment (including watercraft).
- Follow chain of custody procedures for sample collection and handling.

Instrumentation Technician

- Set up and calibrate lab instruments and equipment.
- Perform preventive and corrective maintenance on lab instruments.
- Deploy and set up field sampling/monitoring equipment.

Lab Analysis Technician

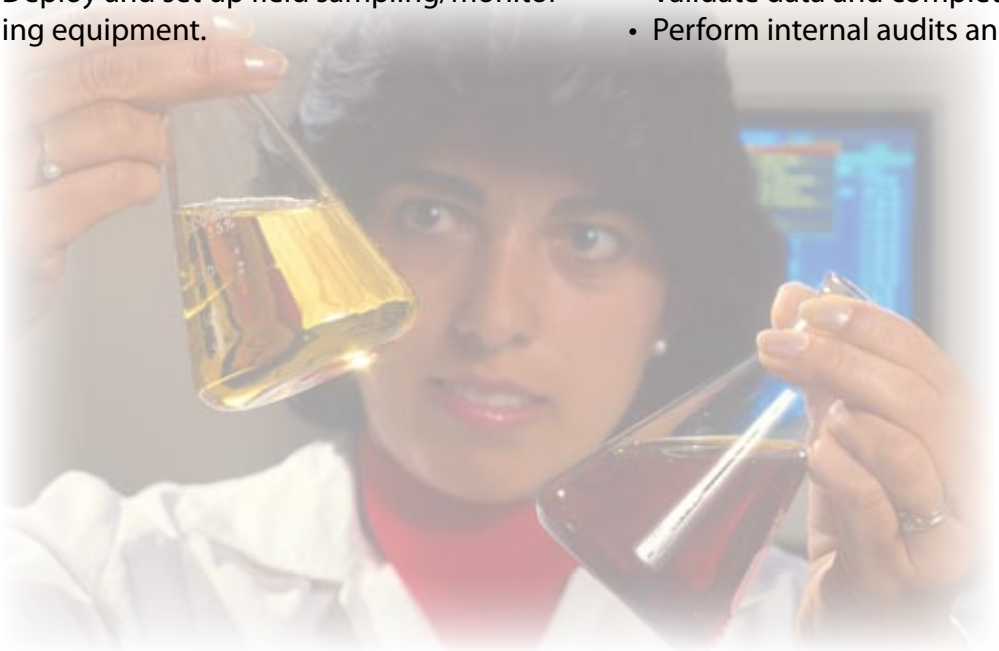
- Analyze samples, calculate results, and develop reports.
- Interpret and explain lab analysis results to clients.
- Follow quality assurance/quality control (QA/QC) program procedures.
- Interpret QA/QC results.

Laboratory Health and Safety Supervisor

- Manage health and safety data.
- Train staff on health and safety SOPs.

Quality Assurance/Quality Control (QA/QC) Technician

- Develop QA/QC standard operating procedure (SOP) for program.
- Complete analyses and calculations.
- Validate data and complete reports.
- Perform internal audits and reviews.



PLANT MAINTENANCE

- High Voltage Electrician
- Low Voltage Electrician
- Plant Maintenance Supervisor
- Plant Maintenance Technician

JOB FUNCTIONS

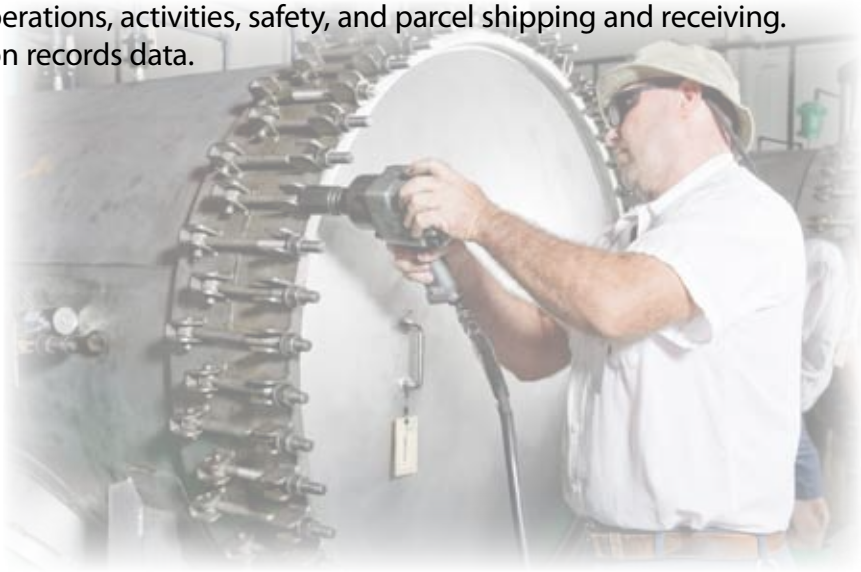
High Voltage Electrician

Low Voltage Electrician

Plant Maintenance Supervisor

Plant Maintenance Technician

- Perform preventive and routine maintenance on plant equipment.
- Identify equipment needs, and scheduled and completed maintenance records.
- Conduct performance tests of plant equipment.
- Diagnose, troubleshoot, update, and repair malfunctioning plant equipment.
- Maintain, repair, and overhaul plant equipment (e.g., aeration blowers, barminutors, pumps, motors, compressors, belt press, valves, drive units, hydraulic control units, chlorinators, chemical feeders, pneumatic equipment, hydraulic pressure systems, emergency generators).
- Participate in the installation of plant equipment.
- Participate in the modification of equipment for maximum treatment process performance.
- Perform pipefitting for installation and repair of air, sewer, and hydraulic piping systems.
- Interpret drawings, blueprints, schematics, and diagrams for water/wastewater systems.
- Assist with maintenance of Supervisory Control and Data Acquisition (SCADA) system and instrumentation.
- Maintain records of plant function readings and equipment history.
- Maintain records on plant operations, activities, safety, and parcel shipping and receiving.
- Prepare a variety of reports on records data.



REGULATIONS AND COMPLIANCE

JOB FUNCTIONS

- Biosolids Land Application Technician
- Combined Sewer Overflow (CSO)/Sanitary Sewer Overflow (SSO) Monitoring Specialist
- Cross-Connection Control Specialist
- Enforcement Specialist
- Environmental Compliance Technician
- Fats/Oils/Grease (FOG) Manager
- FOG Inspector
- Industrial Pretreatment Specialist
- Large Animal Confinement Inspector
- Permit Specialist
- Pretreatment Manager
- Stormwater Compliance Inspector

Biosolids Land Application Technician (Soil Science)
- Assist in determining where biosolids can be applied on land.
- Assist in reviewing soil analysis results.
- Assist in developing land application management plan.
- Assist in reviewing emerging state and federal land application regulatory requirements.

Combined Sewer Overflow (CSO)/Sanitary Sewer Overflow (SSO) Monitoring Specialist
- Oversee compliance with regulatory requirements for CSOs and SSOs.
- Conduct monitoring following CSO and SSO events.
- Conduct community outreach and lead public education efforts.

Cross-Connection Control Specialist
- Inspect cross-connection control devices.
- Enforce provisions of cross-connection control ordinance.
- Complete reports.

Enforcement Specialist
- Cite entities that violate environmental ordinances.
- Present cases in court.
- Work with violators to remedy ordinance violations.

JOB FUNCTIONS

Environmental Compliance Technician
- Assists with compliance reviews of regulatory permits.
- Assists with oversight of environmental compliance programs (e.g., FOG, pretreatment, cross-connection control).
- Assists with reviewing emerging state and federal regulations.

Fats/Oils/Grease (FOG) Manager
- Develop and update the FOG ordinance.
- Develop and implement the FOG program.
- Stay current with FOG regulatory requirements.

FOG Inspector
- Review plans.
- Inspect grease interceptor installations.
- Complete reports.

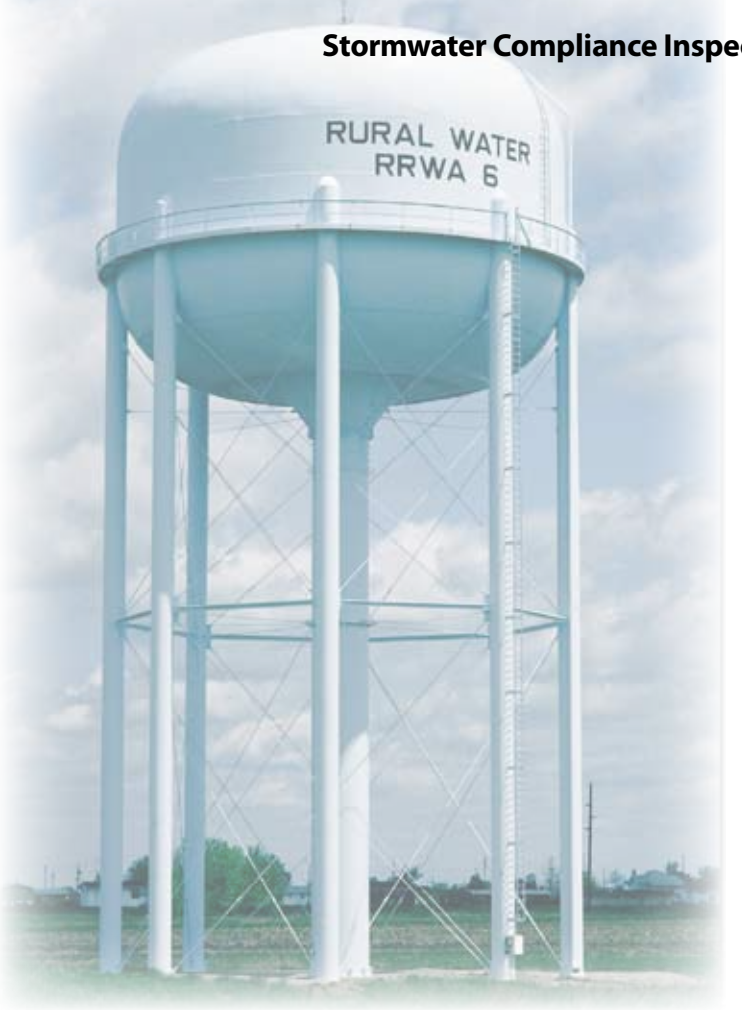
Industrial Pretreatment Specialist
- Conduct industrial monitoring and inspection.
- Review industrial discharge monitoring reports.

Large Animal Confinement Inspector

Permit Specialist
- Complete permit applications.
- Review and interpret state and federal regulations.

Pretreatment Manager
- Oversee all aspects of the industrial pretreatment program.
- Develop and update pretreatment ordinance.
- Determine which industries need permits.

Stormwater Compliance Inspector



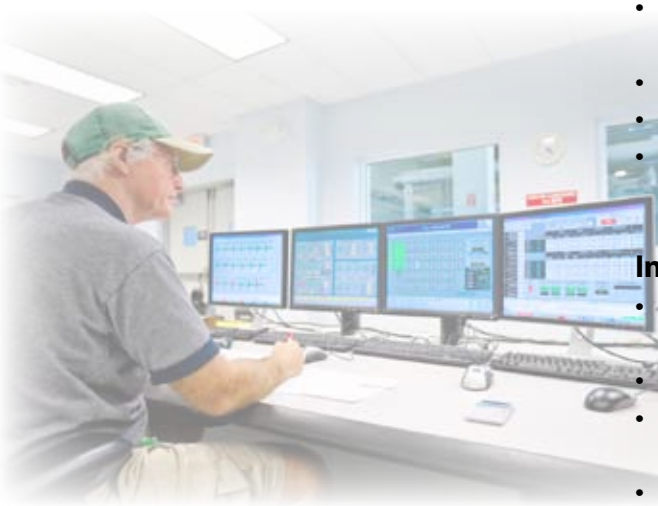
JOB FUNCTIONS

WASTEWATER OPERATIONS

- Chief Operator
- Collection System Operator*
- Industrial Pretreatment Operator
- Instrumentation Technician*
- Plant Operator*
- Pretreatment Coordinator
- Process Control Operator**

Chief Operator
(permit, management)

- Manage overall activity.
- Perform plant operator duties, as necessary.
- Report noncompliance with internal standards and government regulations.
- Provide information to governing boards.
- Oversee safety compliance.
- Plan emergency activities.
- Set budget.
- Sign Discharge Monitoring Report (DMR).
- Hire/monitor for proper, qualified staff.
- Provide disciplinary directives/employee professional development.
- Perform operator training.
- Communicate with public.
- Recommend equipment replacement.
- Maintain licensure and continuing education requirements.



Collection System Operator*
(construction, inspection, pump stations, line repair/cleaning)

- Operate and maintain heavy equipment (e.g., sewer cleaning and vacuum trucks).
- Clean, inspect, and maintain equipment, lines, and related light equipment.
- Perform operator training.
- Maintain equipment and supply inventory.
- Prepare work orders and service requests.
- Perform pretreatment tasks (adding chemicals and inspecting businesses).
- Respond to complaints and emergencies (combined sewer overflow (CSO) and sanitary sewer overflow (SSO)).
- Repair, replace, and reline manholes, pipes, etc.
- Properly dispose of solid wastes (e.g., grit, debris).
- Apply compliance standards and regulations to applicable processes.
- Locate inflow and infiltration, and eliminate.
- Conduct smoke testing.
- Maintain licensure and continuing education requirements.

Industrial Pretreatment Operator

- Operate and adjust pumps, equipment, vehicles, and hand tools.
- Troubleshoot process problems.
- Collect, handle, analyze, and evaluate samples.
- Prepare work orders and service requests.
- Maintain chemical and supply inventory.

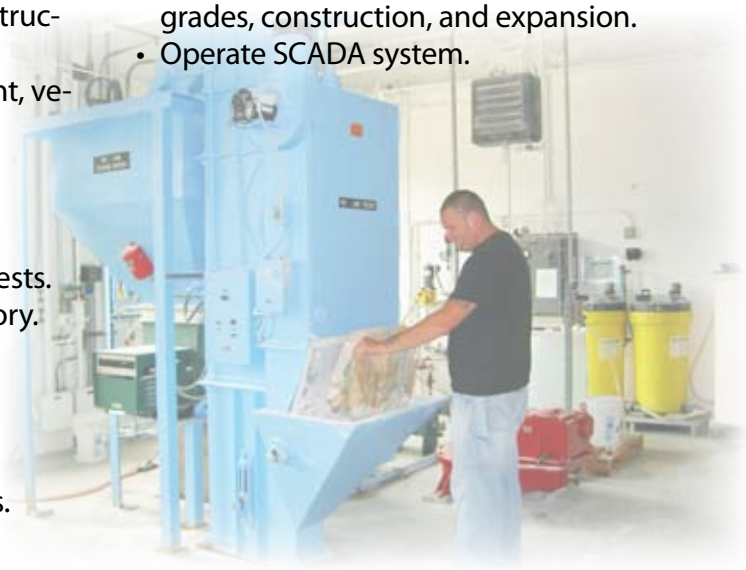
- Respond to emergencies.
- Monitor instruments, equipment, and processes.
- Develop procedures.
- Interact with and prepare reports for regulatory entities.
- Interpret and apply regulatory requirements.
- Maintain licensure and continuing education requirements.

Instrumentation Technician*
- Maintain, repair, and calibrate instruments.
- Coordinate activities with others (e.g., compliance, engineering, laboratory).
- Evaluate and recommend new instruments.
- Prepare instrument specifications.
- Order parts.
- Install and operate equipment.
- Develop operating procedures.
- Train operators.
- Communicate with information technology department on computer controlled systems.
- Operate and maintain ancillary systems (e.g., HVAC, cogeneration).
- Assist vendors/manufacturer representatives.
- Adhere to safety procedures.

Plant Operator*
(treatment, biosolids, reclamation, construction)
- Operate and adjust pumps, equipment, vehicles, and hand tools.
- Troubleshoot process problems.
- Collect, handle, analyze, and evaluate samples.
- Prepare work orders and service requests.
- Maintain chemical and supply inventory.
- Respond to emergencies.
- Monitor instruments, equipment, and processes.
- Develop procedures.
- Properly handle and process biosolids.
- Maintain licensure and continuing education requirements.
- Operate computer and SCADA systems.

Pretreatment Coordinator
- Apply compliance standards and regulations to applicable processes.
- Perform business inspections/sampling.
- Testify in court as expert.
- Develop and apply local limits.
- Administer/oversee proper dosing of pretreatment chemicals.
- Generate applicable reports and documentation.
- Communicate with regulators, business, and public.
- Operate samplers and meters (e.g., flow, pH).
- Coordinate activities with others (e.g., operations, engineering, process control).

Process Control Operator**
- Use laboratory data to evaluate processes.
- Develop control parameters and procedures.
- Review permits for compliance with government regulations.
- Perform process adjustments as needed.
- Perform operator training.
- Evaluate and provide input on plant upgrades, construction, and expansion.
- Operate SCADA system.



*Various levels, e.g., supervisor, team leader, senior lead, shift supervisor, operator I, operator II, operator III, non-certified maintenance worker, operator-in-training (OIT)

**Various levels, e.g., operator, engineer, supervisor

WATER OPERATIONS

JOB FUNCTIONS

- Cross-Connection Control Specialist
- Distribution Operator/Foreman
- Heavy Equipment Operator
- Industrial Water Systems Operator
- Instrumentation Technician
- Leak Detection Technician
- Meter Reader/Installer
- Meter Tester/Mechanic
- Programmable Logic Controller (PLC) Programmer/SCADA
- Treatment Plant Mechanic
- Utility Locator ("Dig Safe")
- Water Treatment Operator

Cross-Connection Control Specialist
- Operate, calibrate, and maintain backflow test equipment.
- Conduct cross-connection surveys.
- Maintain records and report to regulatory authority.
- Review plans and new installations.

Distribution Operator/Foreman
- Install and repair pipes and other water appurtenances.
- Sample, test, and interpret sampling results.
- Follow chain of custody procedures for sample collection and handling.
- Monitor flows/pressures and tank levels.
- De-chlorinate discharge water.
- Flush and maintain hydrants.
- Inspect and exercise valves.
- Operate and maintain remote sensing equipment.
- Develop standard operating procedures (SOPs).
- Monitor and evaluate system conditions.
- Interact with contractors, site owners, regulatory agencies, and the public.
- Coach, mentor, and cross-train co-workers.
- Perform hydrant fire flow testing.
- Prepare work orders.

Heavy Equipment Operator
- Operate and maintain heavy equipment.
- Assess working conditions and environment, and manage work site accordingly.
- Verify utility line locations.
- Confirm traffic control and safety conditions.
- Communicate with on-site staff.
- Perform and record daily equipment inspections.
- Assist in evaluating changing trench conditions.

Industrial Water Systems Operator
- Operate systems to purify water for utility and industrial use (e.g., boiler, condenser).
- Manage industrial systems condensate.
- Make chemical additions to water for industrial use.
- Manage cooling water and cooling tower systems.

Instrumentation Technician
- Operate, calibrate, and maintain process control equipment.
- Record measurements and document frequency of calibration.
- Install/replace process control equipment.
- Communicate with plant operators.

Leak Detection Technician
- Calibrate, operate, and maintain leak detection equipment.
- Perform leak detection surveys.
- Report leaks and document progress.
- Implement traffic control as required.

Meter Reader/Installer
- Install and replace meters.
- Read meters and record readings.
- Generate report for billing.
- Maintain customer service relations.
- Report anomalies to customer.

Meter Tester/Mechanic
- Operate, calibrate, and maintain meter testing equipment.
- Periodically remove, test, and replace meters.
- Schedule customer appointments.
- Develop and follow SOPs pertaining to confined space and air monitoring.
- Interact with customers.

Programmable Logic Controller (PLC) Programmer/SCADA
- Maintain plant software logic.
- Write variations based on operator input.
- Stay current with new technologies and processes.
- Perform lockout/tagout as required.
- Coach, mentor, and cross-train co-workers.
- Design, develop, and install new software applications.
- Train operator on use of software applications.
- Focus on professional development.

Treatment Plant Mechanic

Utility Locator ("Dig Safe")
- Operate, calibrate, and maintain line locate equipment.
- Accurately mark facilities.
- Develop documentation for contractor on locating site/area.
- Implement traffic control and safety measures.
- Follow utility-specific standard operating procedures (SOPs).
- Report inaccurate location information to GIS/mapping group for correction.

Water Treatment Operator
- Install, calibrate, operate, troubleshoot, and repair equipment.
- Identify system upset and correct by adjusting process control equipment.
- Monitor flow rates, pressures, tank levels, reading gauges, meters, and charts.
- Monitor for plant security.
- Interpret sample results.
- Analyze samples for physical, chemical, and biological results.
- Follow chain of custody procedures for sample collection and handling.
- Evaluate water filtration/sedimentation processes.
- Maintain and evaluate monthly/quarterly/yearly water quality reports.
- Maintain chemical supply inventory.
- Operate computers and SCADA systems.
- Maintain professional certification.
- Troubleshoot operational problems and take corrective action.
- Forecast trends in water field.
- Notify regulatory agencies and public of noncompliance.
- Develop standard operating procedures (SOPs).
- Coach, mentor, and cross-train co-workers.
- Operate and maintain disinfection equipment.
- Operate and maintain process control for chemical dosages.
- Coordinate with other groups on water loss.

JOB FUNCTIONS

WATERSHED AND RUNOFF CONTROL

- Agricultural Water Specialist
- Aquatic Habitat Restoration Technician
- Dredge Operator
- Forestry Technician
- Ground Water Remediation Technician
- Hydrogeology Technician
- Hydrology Technician
- Modeling Technician
- Residential Water Purification Technician
- Septic Tank Maintenance Technician
- Source Water GIS Technician
- Stormwater/MS4 Technician
- Surface Water Monitoring Technician
- Sustainable Landscaper
- Water Conservation Technician
- Well Driller
- Wetland Delineation Specialist

Agricultural Water Specialist

Aquatic Habitat Restoration Technician

Dredge Operator

Forestry Technician
- Assist with development of plans to maintain appropriate timber management.
- Assist with development of plans to ensure water integrity.
- Assist with development of policies for source water protection.
- Collect samples.
- Investigate source water area issues.
- Perform risk assessment.

Ground Water Remediation Technician

Hydrogeology Technician
- Assist in performing assessment and data validation.
- Assist in development of new water sources (e.g., aquifer definition, dam construction).

Hydrology Technician
- Assist with determining stream bed characteristics and measuring stream flow.
- Assist in monitoring water movement to project water quantity.
- Assist with measuring storm impacts on water quantity and quality.
- Assist in predicting and planning to meet future water needs.
- Assist in flood mitigation and flood control activities.
- Assist in validating data and preparing reports.

Modeling Technician
- Input and interpret computer data results.
- Determine pollutant discharge impacts.
- Predict weather/population growth/other impacts.

Residential Water Purification Technician

Septic Tank Maintenance Technician

Source Water GIS Technician
- Input data and map geological features.
- Prepare reports and map overlays.
- Validate data integrity.

Stormwater/MS4 Technician
- Assist in developing stormwater management plans.
- Assist in developing program regulations.
- Perform inspections and maintain compliance with stormwater discharge permit requirements.
- Collect stormwater samples, interpret results, and assist in preparing reports to regulatory entity.
- Develop and implement best management practices to minimize stormwater runoff from property and minimize stormwater contact with equipment, products, and pollutants.

Surface Water Monitoring Technician
- Collect and analyze samples.
- Follow chain of custody procedures for sample collection and handling.
- Perform field analyses.
- Log data.
- Maintain marine equipment (e.g., boats).

Sustainable Landscaper

Water Conservation Technician

Well Driller

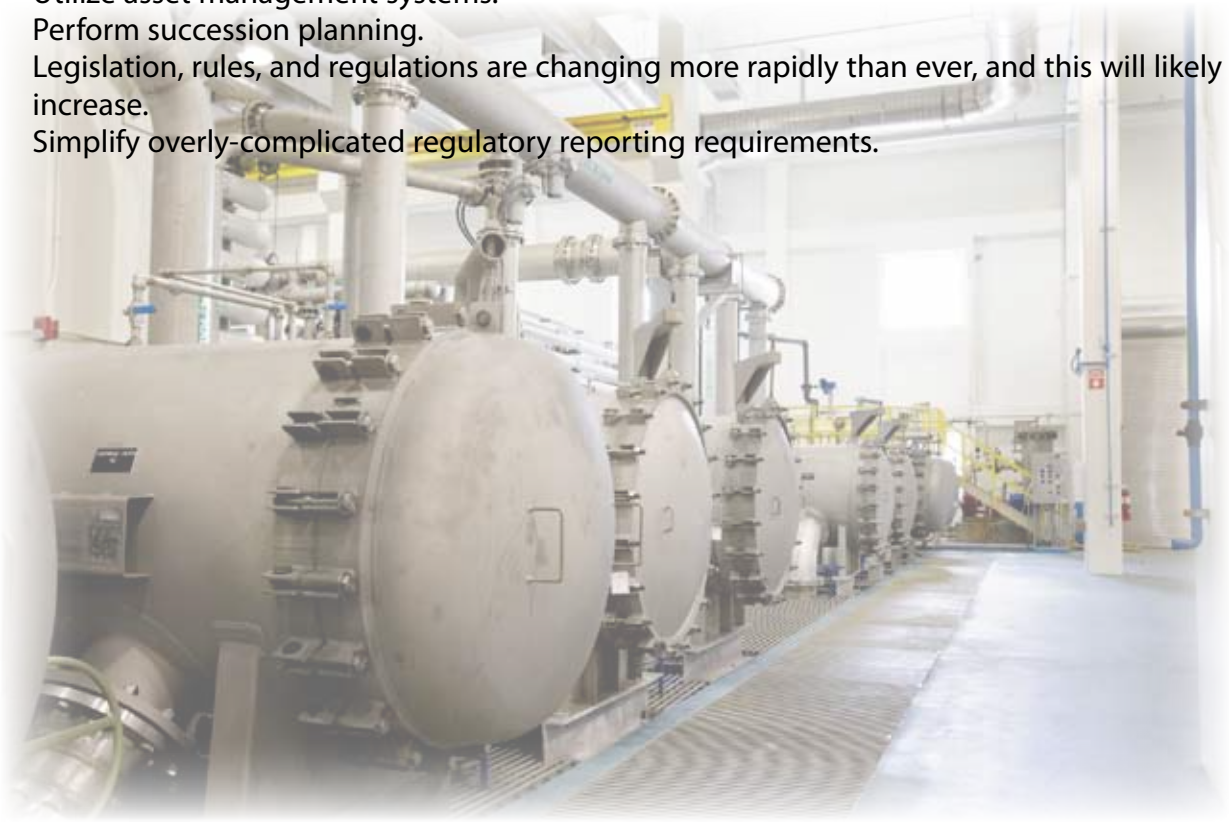
Wetland Delineation Specialist

JOB FUNCTIONS

EMERGING ISSUES AND FUTURE TRENDS

Administration

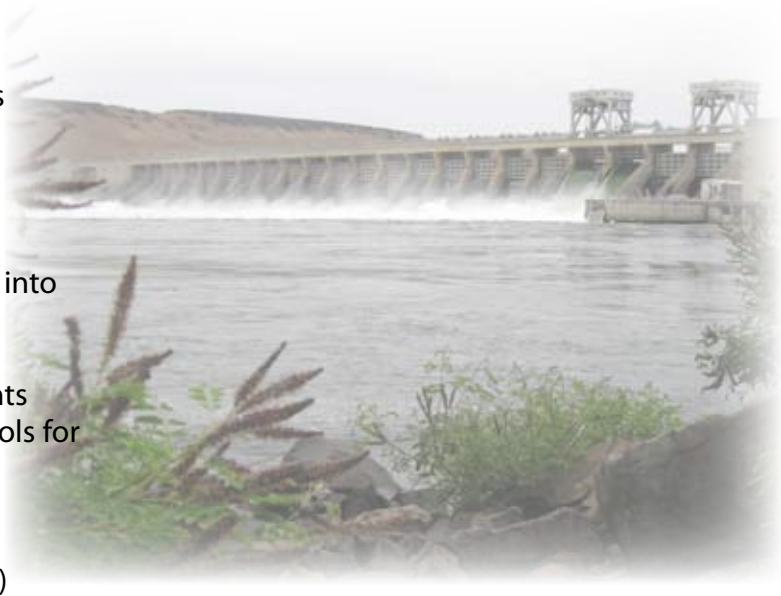
- Manage limited business resources—do more with less. Systems are growing, but budgets are not.
- Provide adequate human resources.
- Retain employees.
- Target research and emphasize regional differences as to water/wastewater needs.
  - o Nutrients management is a coastal concern; not so much of a problem in the middle of the country.
  - o Majority of water plants are small—many size differentials, based on region.
- Systems have historically been decentralized, then became large and centralized. Now they're heading back to being more decentralized.
  - o Centralized facilities tend to be used for economy of scale, but the trend is now moving back in the opposite direction.
  - o Decentralization promotes reclamation and reuse (i.e., reclaim and reuse water at the point of generation).
- Build durability in systems for emergency response, including preparedness for extreme weather and other natural and human-made disasters.
- Address homeland security issues (e.g., training for human-made disasters and emergencies).
- Identify and recover operation maintenance cost between new development and users (full cost recovery).
- Determine how to pay for needed infrastructure.
- Prepare for pollutant credit trading programs.
- Manage distribution and collection for system optimization.
- Utilize asset management systems.
- Perform succession planning.
- Legislation, rules, and regulations are changing more rapidly than ever, and this will likely increase.
- Simplify overly-complicated regulatory reporting requirements.



Outreach
- Perform more public outreach and education.
- Promote public awareness of water issues and recognition of true value of water—cost will only rise.
- Social media is becoming an important communication tool and a means of knowledge transfer.
- Promote conservation (using less water, etc.).

Sustainability
- Plan for systems sustainability and resiliency.
- Water professionals need to be more aware of production of greenhouse gases from various treatment processes.
- Promote energy efficiency and plant optimization.
- Consider gray water systems.
- Consider reclaimed water—direct and indirect water reuse.
- Manage nonpoint source pollution.

Technology
- Green infrastructure
- Sustainable and resilient systems
- Energy recovery
- Nutrient recovery
- Desalination
- Resources reuse
- Integration of renewable energy into facilities (energy recovery, etc.)
- Quality assurance technology
- Management of microconstituents
- Increased use of computer controls for treatment processes
- Advances in analyzing data
- Zero discharge technologies
- AMR (Automated Meter Reading)
- Global access to safe drinking water (wells, purification)



Training
- Funding
- Distance training
- Encourage operators to become trainers, to utilize experienced operators' knowledge in training.
- Standardize the requirements for Continuing Education Units (CEUs) and contact hours across the country (currently developed state by state).
- Mandatory certification for wastewater
- Stormwater certification
- Promote knowledge transfer and ability to operate facility in a manual mode during an emergency and/or disaster.
- Leadership development

HOW CAN HIGH SCHOOLS AND COMMUNITY COLLEGES CONTRIBUTE TO THE WATER MANAGEMENT FIELD?

High school and community college guidance counselors and advisors need to convey to potential students what a valuable and important line of work Water Management can be. Not many people initially consider the water field, but it's a great and relatively stable career path. Additionally, it's largely immune to external anomalies and cannot be exported outside the U.S. This report is an excellent tool for outreach to middle schools, high schools, and colleges to promote Water Management as the up-and-coming, critical career field it has become.

Community colleges need to research the specific type of need for water professionals in their area and region (needs analysis and/or occupational analysis). Advisory committees comprised of local and regional practitioners in the water management field must be developed and collaboration established with business and industry. Business and industry partners must be involved in establishing the real-world occupational tasks that students, as potential employees, must perform (e.g., job task analysis or DACUM). Finally, educators must ensure that this industry input is incorporated into community college programs, to ensure both student and business needs are met (curriculum development) to produce the next generation of Water Professionals in the Water Management field. Again, we hope this Defining Water Management report can facilitate these activities and provide the background and documentation needed to help start new or expanded workforce training opportunities.

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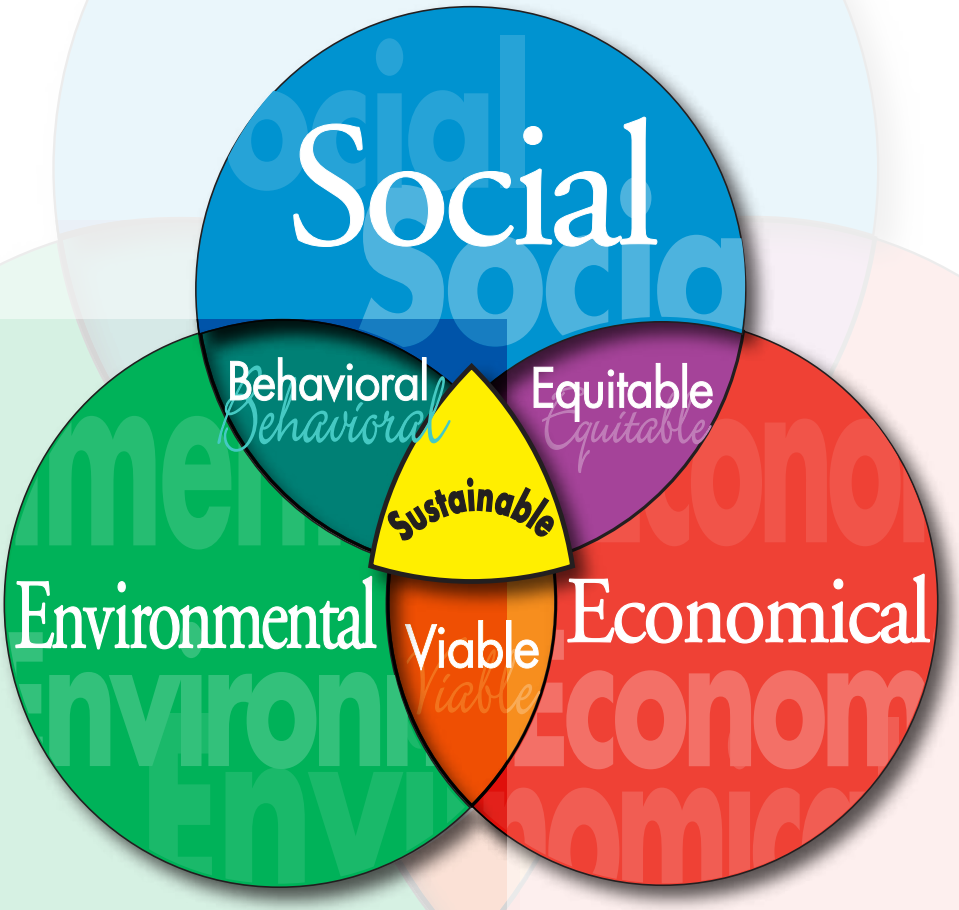

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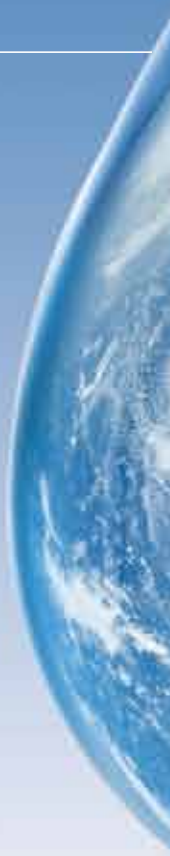

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