Workforce Planning for Water Utilities—Successful Recruiting, Training, and Retaining of Operators and Engineers

Subject Area: Efficient and Customer-Responsive Organization
Workforce Planning for Water Utilities—Successful Recruiting, Training, and Retaining of Operators and Engineers
About the Awwa Research Foundation

The Awwa Research Foundation (AwwaRF) is a member-supported, international, nonprofit organization that sponsors research to enable water utilities, public health agencies, and other professionals to provide safe and affordable drinking water to consumers.

The Foundation’s mission is to advance the science of water to improve the quality of life. To achieve this mission, the Foundation sponsors studies on all aspects of drinking water, including supply and resources, treatment, monitoring and analysis, distribution, management, and health effects. Funding for research is provided primarily by subscription payments from approximately 1,000 utilities, consulting firms, and manufacturers in North America and abroad. Additional funding comes from collaborative partnerships with other national and international organizations, allowing for resources to be leveraged, expertise to be shared, and broad-based knowledge to be developed and disseminated. Government funding serves as a third source of research dollars.

From its headquarters in Denver, Colorado, the Foundation’s staff directs and supports the efforts of more than 800 volunteers who serve on the board of trustees and various committees. These volunteers represent many facets of the water industry, and contribute their expertise to select and monitor research studies that benefit the entire drinking water community.

The results of research are disseminated through a number of channels, including reports, the Web site, conferences, and periodicals.

For subscribers, the Foundation serves as a cooperative program in which water suppliers unite to pool their resources. By applying Foundation research findings, these water suppliers can save substantial costs and stay on the leading edge of drinking water science and technology. Since its inception, AwwaRF has supplied the water community with more than $300 million in applied research.

More information about the Foundation and how to become a subscriber is available on the Web at www.awwarf.org.
### TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>ES-1</td>
<td>Sample of Actions</td>
<td>xxi</td>
</tr>
<tr>
<td>2-1</td>
<td>Demographics of Out-of-Industry Survey Respondents</td>
<td>11</td>
</tr>
<tr>
<td>2-2</td>
<td>Difficulty Level in Locating and Hiring Engineers</td>
<td>12</td>
</tr>
<tr>
<td>2-3</td>
<td>Difficulty Level in Retaining Engineers at Market Level</td>
<td>15</td>
</tr>
<tr>
<td>C-3</td>
<td>2005 High School Graduates</td>
<td>138</td>
</tr>
<tr>
<td>C-4</td>
<td>Associate's Degrees in Engineering, by sex: 1995–2004</td>
<td>139</td>
</tr>
<tr>
<td>C-5</td>
<td>Science and Engineering Associate's Degrees Awarded by Leading Institution, by Race/Ethnicity of Minority Graduates, 2000-04</td>
<td>140</td>
</tr>
<tr>
<td>C-6</td>
<td>Bachelor's Degrees Awarded in Engineering by Sex, Citizenship, and Race/Ethnicity: 1995–2004</td>
<td>143</td>
</tr>
<tr>
<td>C-7</td>
<td>Percent Changes in Bachelor's Degrees Awarded in Engineering by Sex, Citizenship, and Race/Ethnicity: 1995–2004</td>
<td>144</td>
</tr>
<tr>
<td>C-8</td>
<td>Science &amp; Engineering Bachelor's Degrees Awarded by Leading Institutions by Sex: 2000–2004</td>
<td>147</td>
</tr>
<tr>
<td>C-9</td>
<td>Science &amp; Engineering Bachelor's Degrees Awarded by Leading Institutions, by Race/Ethnicity of Minority Graduates: 2000–2004</td>
<td>148</td>
</tr>
<tr>
<td>C-10</td>
<td>Engineering Associations</td>
<td>149</td>
</tr>
<tr>
<td>C-11</td>
<td>Profiles of Displaced Workers (1), 2006</td>
<td>152</td>
</tr>
<tr>
<td>C-12</td>
<td>Profiles of Veterans, 2000-2033</td>
<td>153</td>
</tr>
<tr>
<td>C-13</td>
<td>Veterans Associations</td>
<td>154</td>
</tr>
</tbody>
</table>
FIGURES

ES-1 Strategies Can Be at Various Levels and Applied Utility-Specific or Industry Wide......xx

ES-2 Research Indicates That Out-of-Industry Organizations Proactively Manage the Career Life Cycle................................................................................................ xxii

1-1 Unique Approach Leveraged All Stakeholders for Successful Workforce Planning...........2

2-1 College Plans of High School Graduates .............................................................................5

2-2 The Number of Associate Degrees in Engineering Remains Constant..............................6

2-3 Enrollment of Civil Engineering Undergraduates Remains Steady .....................................7

2-4 Untapped Pools of Workers..................................................................................................8

2-5 Displaced Workers Reflect Diversity ...................................................................................9

2-6 Map Showing the U.S. Census Regions ...............................................................................9

2-7 Veterans Provide a Pool of Candidates for Utility Recruitment ........................................10

2-8 Effective Recruiting Sources for Engineers (Out-of-Industry) Survey ..............................12

2-9 Training Evaluation Methods Used in Out-of-Industry Organizations ................................14

2-10 Out-of-Industry Retention Strategies and Practices ..........................................................14

2-11 Comparison of Culture by Level of Difficulty Retaining Engineers .........................15

2-12 Diversity Practices Used by Out-of-Industry Organizations ..........................................16

3-1 Current FTEs to Budgeted FTEs Shows a Significant Difference .....................................18

3-2 Percentage of Vacancies.....................................................................................................18

3-3 Average Tenure of Engineers and Operators .....................................................................19

3-4 Percentage of Operators and Engineers Eligible to Retire ...............................................19

3-5 Reasons Engineers Leave Their Positions..........................................................................20

3-6 Reasons Operators Leave Their Positions ..........................................................................20

3-7 Typical Methods Utilities Use for Recruiting Engineers ..................................................21
C-17 Performance Review Process.................................................................184
C-18 Employee Recognition Activities...........................................................186
C-19 Description of Culture...........................................................................187
C-20 Comparison of Culture by Level of Difficulty Retaining Engineers........188
C-21 Diversity Activities................................................................................189
FOREWORD

The Awwa Research Foundation is a nonprofit corporation that is dedicated to the implementation of a research effort to help utilities respond to regulatory requirements and traditional high-priority concerns of the industry. The research agenda is developed through a process of consultation with subscribers and drinking water professionals. Under the umbrella of a Strategic Research Plan, the Research Advisory Council prioritizes the suggested projects based upon current and future needs, applicability, and past work; the recommendations are forwarded to the Board of Trustees for final selection. The foundation also sponsors research projects through the unsolicited proposal process; the Collaborative Research, Research Applications, and Tailored Collaboration programs; and various joint research efforts with organizations such as the U.S. Environmental Protection Agency, the U.S. Bureau of Reclamation, and the Association of California Water Agencies.

This publication is a result of one of these sponsored studies, and it is hoped that its findings will be applied in communities throughout the world. The following report serves not only as a means of communicating the results of the water industry's centralized research program but also as a tool to enlist the further support of the nonmember utilities and individuals.

Projects are managed closely from their inception to the final report by the foundation's staff and large cadre of volunteers who willingly contribute their time and expertise. The foundation serves a planning and management function and awards contracts to other institutions such as water utilities, universities, and engineering firms. The funding for this research effort comes primarily from the Subscription Program, through which water utilities subscribe to the research program and make an annual payment proportionate to the volume of water they deliver and consultants and manufacturers subscribe based on their annual billings. The program offers a cost-effective and fair method for funding research in the public interest.

A broad spectrum of water supply issues is addressed by the foundation's research agenda: resources, treatment and operations, distribution and storage, water quality and analysis, toxicology, economics, and management. The ultimate purpose of the coordinated effort is to assist water suppliers to provide the highest possible quality of water economically and reliably. The true benefits are realized when the results are implemented at the utility level. The foundation's trustees are pleased to offer this publication as a contribution toward that end.

David E. Rager
Chair, Board of Trustees
Awwa Research Foundation

Robert C. Renner, P.E.
Executive Director
Awwa Research Foundation
ACKNOWLEDGMENTS

EMA, Inc. acknowledges that the Awwa Research Foundation is the joint owner of certain technical information upon which this publication is based. EMA, Inc. thanks AwwaRF for their financial, technical, and administrative assistance in funding and managing the project through which this information was discovered.

The research project team wishes to thank and acknowledge the significant contributions of the Utility Participants, Project Advisory Committee members, Gwen McDonald, East Bay Municipal Utility, Sandy Oblonsky, Valley Water, Sumedh Bahl, Ann Arbor, and AwwaRF project manager, Susan Turnquist, without whose involvement, this project would not be possible. There were two teams participating in the project: a Utility Task Force and a Research Advisory Panel.

The utilities participating on the Utility Task Force were:

Akron Public Utilities Bureau, OH
Boston Water and Sewer Commission, MA
Columbus Water Works, GA
Detroit Water and Sewerage Department, MI
Golden State Water Company, CA
JEA, FL
Orange County Utilities Department, FL
Prince Williams County Service Authority, VA
Phoenix Water Services Department, AZ
St. Paul Regional Water Services, MN
Toronto Water, ON Canada
Winnipeg Water and Waste Department, MB Canada

The organizations representing the Research Advisory Panel were:

360water, Inc.
Association of Environmental Engineering and Science Professors (AEESP)
American Federation of State, County and Municipal Employees (AFSCME)
American Water Works Association (AWWA)
California State University, Sacramento, Office of Water Programs
National Society of Professional Engineers
Operation Training Committee of Ohio, Inc. (OTCO)
University of Florida, TREEO Center
Water Environment Federation (WEF) Professional Development Committee
Metro Wastewater Reclamation District (MWRD)
The team also acknowledges the significant contributions of Jim Johnson of the University of North Carolina and Diane Hinds of Employers Association, both of whom provided specialized expertise in the areas of workforce planning and strategies for recruiting, training, and retaining employees.
EXECUTIVE SUMMARY

Several factors are converging simultaneously to create a “perfect storm” in today’s utility workforce. In addition to the mass exodus of utility employees that is anticipated due to retirement in the next 10 years, there is increasing diversity in the current workforce, fewer United States college graduates earning science or technical degrees and values differences in younger generations of employees entering the labor market. Utilities are caught in the center of this storm. A shift in approach to operations is required. Utilities must move away from the “lean operations” mentality that has been forced upon them in recent years – at least in terms of not filling vacancies – and develop a strategic approach to ensure the skills needed to complete the work of the organization are on board.

This research project on Successful Recruiting, Training and Retaining Operators and Engineers to Meet Future Challenges was created to identify practical methods that utilities can implement to address the impact of the labor crisis on their organizations. Specific project goals were to:

- Identify future labor pools for engineer and operator positions
- Identify utilities short and long term needs for operators and engineers
- Identify “attractors” that will draw the younger generations to utilities as a highly desired place of employment
- Identify recruiting, training and retention methods that have elicited successful results in out-of-industry organizations and guidelines for applying those strategies in the utility industry
- Present recommendations for improvements in training and certification programs
- Identify elements of utility culture that will build an organization’s reputation as an employer of choice to multiple generations of employees

PROJECT APPROACH AND PARTNERSHIPS RESULTED IN IMPLEMENTABLE STRATEGIES

The right approach is invaluable for a research project to produce practical results. The approach used in this project included primary and secondary research.

Primary research consisted of two elements:

- A survey of utilities that identified the current state of the industry in terms of success of recruiting, training and retaining operators and engineers.
- Interaction with students and young professionals, first in a “reverse career fair” conducted at ACE and WEFTEC that involved completion of an on-line survey that assessed important job factors for the GEN Y population; then in focus groups also conducted at ACE and WEFTEC that probed further into issues such as the participants experiences with co-op programs, how they learned of the water and wastewater industry, and the factors they investigate when considering an employer.

Secondary research was completed in two areas:

- Diane Hinds, of Employers Association identified successful recruitment and retention strategies from out-of-industry organizations.
- James Johnson, of the University of North Carolina at Chapel Hill, conducted a demographic analysis that identified new and existing pools of potential workers as well as channels to reach those pools.
The results of this research were then compiled into industry-wide and utility specific strategies for recruiting and retaining engineers and operators. The strategies represent three targets for action, as shown in Figure ES-1:

- Building positive awareness of the utility industry and a specific utility.
- Policies and regulations at the legislative level or specific to a utility or city that support building a sustainable workforce.
- Recruitment, development, and retention strategies – some specific to an individual organization practice, others targeted for the industry.

Figure ES-1. Strategies Can be at Various Levels and Applied Utility-Specific or Industry-Wide

KEY RESEARCH RESULTS

While most utilities responding to the survey report that their utility is not fully staffed, the percentage of vacancies varies widely – from a reported low of 5% to a high of 19% for all utility positions. However, there is a different story regarding vacancies in engineering positions. Utilities reported ranges from 5% to 47% vacancies for Engineer positions; and for Operator positions from 5% to 41% for (Treatment) Operators. Utility survey data also showed that the salary and benefits offered by a utility were the primary retention factors for both engineers and operators currently employed by the utility.

In the reverse career fairs conducted at ACE and WEFTEC, students and young professionals were asked to rate the criteria most important to them in a job. Students (still enrolled in college) and young professionals (under aged 30 working in the utility industry) agreed that the top three attractors to a position are:

- Work that enables learning and growth
- Work that is enjoyable
- Work that is personally stimulating

The secondary research conducted on out-of-industry organizations by Employers Association identified the most effective recruiting strategies for engineers to be internet job sites...
(such as monster.com), private employment agencies and employee referrals. The most effective retention strategies identified in out-of-industry organizations were:

- Flexible work schedule
- On-boarding
- Gift tied to tenure
- Mentoring

The demographic research identified three new pools of potential workers: retirees working full or part time, displaced workers as a result of plant closings or layoffs and military veterans ranging in age from 25 through 54. Use of retirees is a significant strategy for the utility industry to adopt, particularly to be used in knowledge capture and mentoring roles. The pool of military retirees may be an option for some utilities; pools seem geographically concentrated in the East, South and Mid-Atlantic states.

STRATEGIES PROVIDE PRACTICAL APPROACHES TO ADDRESS RECRUITMENT AND RETENTION ISSUES

Again, actions identified from project research are presented as industry-wide or utility-specific, and target actions at the awareness, policy and regulation, and practice level. Table ES-1 presents a sampling of actions presented in this report.

<table>
<thead>
<tr>
<th>Table ES-1</th>
<th>Sample of Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Industry-Wide</strong></td>
<td><strong>Awareness</strong></td>
</tr>
<tr>
<td></td>
<td>Industry organizations work together to market the attractors of the utility industry such as “caretakers of the environment” or “using cutting edge technologies”</td>
</tr>
<tr>
<td><strong>Utility-Specific</strong></td>
<td>Brand your utility by passively advertising the attractors to your organization on busses and billboard.</td>
</tr>
</tbody>
</table>
Research from out-of-industry organizations clearly showed that successful organizations proactively manage the employee relationship with the organization from the time the employee is hired through the end of the relationship. Figure ES-2 illustrates this concept.

![Figure ES-2. Research Indicates That Out-of-Industry Organizations Proactively Manage the Career Life Cycle](image)

Employee Life Cycle Management assumes an employee is at risk of leaving the organization at various points in their tenure. The most successful managers are those who proactively manage the employee relationship taking steps to keep the employee highly engaged and committed to the organization’s success. Actions taken could include training, new types of work, mentoring, etc. All are aimed at diverting risk.

**UTILITY-SPECIFIC: HOW TO GET STARTED**

Chapter 5 of this research report provides a process that a utility can follow to begin addressing workforce issues. The first action a utility must take is to understand their unique situation or their “perfect storm”. This involves completing a “gap analysis” that reflects the anticipated inflows and outflows to the organization’s labor pool anticipated in the next 5 years. Changes may be due to retirements, terminations, demotions, promotions, disabilities, new hires, transfers, redesigned work practices, new facilities, or changing regulations. These data are key to business planning for the utility; successful operations require the appropriate skill sets to complete the work.

Utilities can then complete a workforce practices assessment that compares their current practices against most effective practices in areas such as compensation and rewards, training and certification, generational and cultural awareness, recruitment and outreach, and other practice areas. A “mini-assessment” of workforce practices is on the CD included with this report. Responding to these 15 questions as a management team will provide a clear picture of current organization practices that are not effectively providing solutions to workforce issues. This interactive tool points you to strategies included in the report that may improve your results in a specific practice area.
Completing the “gap analysis” provides a picture of your future labor situation. Completing the workforce practices assessment tells you if the strategies you are currently using to address workforce issues are providing the results you need and direct you to strategies that could provide more effective results.

**INDUSTRY-WIDE: THE TIME IS NOW**

Now is the time to come together as an industry to address the labor shortage that will impact every utility. Change at the industry level will occur due to utilities proven ability to work together to provide sustainable results. Projects such as the Water/Wastewater Agency Response (WARN) system have proven that utilities collaborate successfully. In the area of workforce planning, opportunities abound for collaboration among utilities, states and sections such as:

- Developing a common approach and curricula that utilities can use for leadership development. This could be structured similar to the program provided at the University of North Carolina Chapel Hill (Water and Wastewater Leadership Center) yet have a focus on preparing mid-managers and supervisors for leadership. Regional programs and “distance learning” or computer-based programs could be developed.
- Developing an apprenticeship program that can be shared by small to medium sized utilities in a geographic region; or a framework with curricula and materials that can be rapidly implemented at a single utility.
- Developing an industry-wide program for public awareness and image building that enhances the image of the industry in the eyes of the Gen Y population.

The utility industry is at a critical time juncture. New methods of recruiting workers to the industry must be developed now to effectively meet the shift anticipated in 2012 when there are more jobs in the United States than there are people skilled to fill those jobs. This report provides highly implementable strategies to assist the industry getting started with this critical endeavor.
CHAPTER 1
INTRODUCTION AND APPROACH

PROJECT GOALS/OBJECTIVES

The utility industry is undergoing a dramatic transformation. Due to the realities of an aging Baby Boomer workforce, there will be a mass exodus of utility employees to retirement and the private sector in the next 10-15 years. Several factors are converging simultaneously that exacerbate this labor shift:

- The “lean operations” mentality that has been forced upon utility managers in the recent years
- The increasing diversity of the current and future workforce, particularly the rapid growth rate of Hispanic and Asian workers
- The shrinking number of college graduates in the United States earning science or technical degrees
- And the “value differences” of the younger generations of employees entering the labor market

While this dramatic workforce shift is not unique to the utility industry, it does have the potential to hit harder and sooner than it may in out-of-industry organizations due to the age and tenure of the water utility workforce.

This research project on *Successful Recruiting, Training and Retaining Operators and Engineers to Meet Future Challenges* identifies practical methods that utilities can implement to address the impact of this labor crisis on their individual organizations. The resulting methods will assist utilities in thinking systematically and strategically about their work environment and practices that impact recruiting, training and retaining employees.

This research project:

- Identifies future labor pools specifically for engineer and operator positions
- Identifies utilities’ short and long term needs for operators and engineers
- Identifies “attractors” that will draw the younger generations to utilities as a highly desired place of employment
- Identifies recruiting, training, and retention applications that have elicited successful results in out-of-industry organizations
- Identifies guidelines for application of out-of-industry strategies, tools, and techniques in the utility industry
- Presents recommendations for improvements in training and certification programs
- Identifies elements of utility culture that will build an organization’s reputation as an employer of choice to multiple generations of employees

PROJECT APPROACH FORMED THE BASIS FOR EFFICIENT AND EFFECTIVE RESEARCH

The right approach is invaluable for a research project to produce practical results. A proven project approach that focused on leveraging and adapting considerable expertise in recruitment, training, and retention already developed in out-of-industry organizations brought immediate learning to this project. State of the industry research into the needs of utilities
clarified the crisis nature of the impending workforce shift. The six-step methodology applied to this project is shown in Figure 1-1.

These six steps resulted in:
1. Defining projected workforce demographics and utilities’ needs for operators and engineers.
2. Identifying workplace culture, environment, and practices of utility organizations that attract and retain new employees.
3. Establishing strategies and tactics for utilities to meet the challenge posed by the recruiting, training, and retention of operators and engineers.
4. Recommending changes in the industry to better enable successful training and certification programs and to promote an “employment of choice” culture.
5. A practical guidance document providing strategies, proven tactics, and sample programs for workforce planning that utilities can adapt for their organization.

UTILITY PARTICIPATION IN THE PROJECT

Success in this research project resulted from the key stakeholders that participated by providing guidance, feedback, and direction throughout the project. These stakeholders represent
two distinct groups – one that needs future employees (Utility Participants) and one that provides, trains, or organizes the employees (Research Advisory Panel).

Participating Utilities: This group played a vital role in the research project by developing and completing the initial survey to determine the needs of drinking water utilities. Participating utilities include:

- Akron Public Utilities Bureau, OH
- Boston Water and Sewer Commission, MA
- Columbus Water Works, GA
- Detroit Water and Sewerage Department, MI
- JEA, FL
- Orange County Utilities Department, FL
- Prince William County Service Authority, VA
- Phoenix Water Services Department, AZ
- St. Paul Regional Water Services, MN
- Toronto Water, ON, Canada
- Winnipeg Water and Waste Department, MB, Canada

RESEARCH ADVISORY PANEL REPRESENTED THE EDUCATION, TRAINING AND DEVELOPMENT NEEDS OF THE UTILITY INDUSTRY

This group was comprised of associations and organizations that have a stake in the training, recruiting, and retaining of workers specific to the water industry. This panel participated in the project at crucial stages to identify how the industry as a whole, can enable changes in education, training, certification, and related regulation.

- 360water, Inc.
- Association of Environmental Engineering and Science Professors (AEESP)
- American Federation of State, County and Municipal Employees (AFSCME)
- American Water Works Association (AWWA)
- California State University, Sacramento, Office of Water Programs
- National Society of Professional Engineers
- Operation Training Committee of Ohio, Inc. (OTCO)
- University of Florida, TREEO Center
- Water Environment Federation (WEF) Professional Development Committee
- Metro Wastewater Reclamation District (MWRD)
CHAPTER 2
SECONDARY RESEARCH

As the first step in this research project, secondary research was conducted that focused on emerging demographics and “out of the water industry” strategies for recruiting, training, and retaining employees. Two separate research initiatives were undertaken in these focus areas:

- The first initiative focused on identifying and compiling demographic data from organizations such as the Bureau of Labor Statistics that identifies new and existing pools of potential employees for the water industry to target in their recruiting efforts.
- The second research initiative focused on surveying out-of-industry organizations to identify successful workforce strategies for recruiting, training, and retaining employees.

The results of both research initiatives are provided in Appendix C and summarized in this chapter.

DEMOGRAPHIC RESEARCH IDENTIFIES APPLICANT EXISTING POOLS FOR TARGETED UTILITY RECRUITMENT

The demographic research identified four pools of existing applicants for future operator and engineering positions. The pools are presented and discussed in the following report sections.

High School Graduates

High school graduates who completed the vocational or general educational course of study are a potential pool for operator positions. Figure 2-1 shows the percentages of high school graduates not planning to attend college.

![2005 High School Graduates](image)


Figure 2-1. College Plans of High School Graduates
Community College Graduates

A second identified pool of potential applicants for operator positions is community college graduates who have earned an associates degree in engineering. Initially, an organization could recruit from this pool for plant operators then continue to invest in the employees education to “grow your own” engineers. The continuing education strategy may make the plant operator job more attractive.

Figure 2-2 illustrates that Associates Degrees in Engineering continue to be awarded at a steady level for both male and female students.

![Associate Degrees in Engineering](image)

*Source: National Science Foundation, 2006.*

Figure 2-2. The Number of Associate Degrees in Engineering Remains Constant

Traditional College Graduates With Engineering Degrees

Graduates of four year colleges and universities who have a Bachelor of Science in Engineering form a potential pool of applicants for engineering positions. Additionally full-time undergraduate enrollments in Civil Engineering are also steady as shown in Figure 2-3. This is a source of potential engineer applicants.
Currently Employed Engineers

The competition for Engineers in utilities is fierce. Research indicated the utility industry is recruiting employees from other utilities and professional associations in order to meet their labor demands. This is a reality that most utilities in metropolitan areas already struggle with.

Professional associations and affinity programs that represent various constituencies are an untapped source for both engineers and plant operators. The University of North Carolina report included in Appendix C provides multiple tables that list associations that utilities can target for recruitment.

Recruitment Strategies Differ for Engineers and Operators

The two positions (engineers and operators) require different recruitment strategies. For example, pay differences affect the geographic range of recruitment – engineer recruitment can be nationally/internationally focused while operator recruitment is likely to be geographically localized. Age differences in current plant operators impact the necessity to act to recruit future plant operators. Plant operators in the Northeast (average age 49.6) and West (average age 46.9) are significantly older than those in the Midwest (average age 41.2) and South (average age 40). The data show that plant operators in metropolitan areas (average age 42.4) are older than in non-metropolitan areas (average age 36.9). These data indicate that succession planning for plant operators is a more pressing issue in the Northeast and West and metropolitan areas than in the South and Midwest and non-metropolitan areas.

The water industry workforce is more diverse racially and ethnically than out-of-industry labor pools according to Olstein et al. (2005) in an AwwaRF/WERF study, indicating inclusion is a central strategy for utility recruitment and retention. The Olstein study also revealed a gender imbalance in water utilities regarding the presence of women in the utility workforce – even though women are 55% of college attendees. Olstein’s conclusion is that recruiting women should be a strategy utilities pursue. Women represented 20% of the engineering degrees awarded in 2004, with minorities representing 28.6% of engineering graduates.

Reviewing salary data for both engineers and operators, shows that investing in continuing education for individuals in those occupations (civil engineering technicians,
environmental engineering technicians, and survey and mapping technicians) may be a piece of a broader strategy for creating the next generation of workers in the water industry.

NEW POOLS OF APPLICANTS REQUIRE NEW RECRUITING STRATEGIES

The secondary research identified three new potential pools of applicants for both engineering and plant operator positions that utilities can target with new recruiting strategies. The pools are older workers, displaced workers, and veterans which represents a labor pool of 28 million potential applicants. See Figure 2-4 for distribution of these pools.

![Potential Workforce Graph](image)

*Source: Employers Association Survey 2007*

**Figure 2-4. Untapped Pools of Workers**

Older Workers

Approximately 15 million of the 35 million members of the American Association for Retired Persons (AARP) are employed full or part time indicating utilities should revise Human Resource policies in order to:

- Allow older workers as temporary workers or consultants
- Offer part-time work with and without benefits
- Provide incentives such as retirement health benefits, prescription drug coverage, dental and vision plans, and long-term care insurance to entice older workers to remain in the workforce

Implementing phased retirement is another strategy for organizations to retain older workers.

For recruiting plant operators, utilities may benefit from forming an alliance with AARP’s Senior Community Service Program which is a worker-training program for low income persons 55+ that helps them find skills and experiences for permanent employment – which is congruent with the fact that plant operators receive most of their training on the job.
Displaced Workers

Displaced workers are predominantly Caucasian, ages 25 – 64, from non-agricultural industries including transportation and utilities. Geographically they are concentrated in the East North Central, Middle Atlantic, Pacific and South Atlantic regions of the country. The pool is both geographically and ethnically diverse (Figure 2-5).


Figure 2-5. Displaced Workers Reflect Diversity


Figure 2-6. Map Showing the U.S. Census Regions
Many displaced workers gained that identifier due to plant or company closings, insufficient work or position or shift abolition. Monitoring plant closing databases is one way for utilities to gain first mover advantage with displaced workers.

Veterans

Persons transferring out of the military are also a potential pool of applicants for plant operator positions. They are primarily located in the South Atlantic, East South Central, Middle Atlantic and West South Central; see map of US Census Regions on previous page (Figure 2-6). As shown in Figure 2-7 below, there are 24.8 million veterans in the US, one-third of who are between the ages of 25 – 54 and one fourth between the ages of 55 – 64.

![Veterans Distribution Map]

Source: Employers Association Survey 2007

Figure 2-7. Veterans Provide a Pool of Candidates for Utility Recruitment

Strategies for recruiting veterans include participation in job fairs for military personnel moving back into civilian life, and forging alliances with more than twenty veterans’ organizations that exist in the US. Our recruiting sites for this pool are provided in Chapter 5.

OUT-OF-INDUSTRY RESEARCH IDENTIFIES SUCCESSFUL RECRUIT-MENT, TRAINING, AND RETENTION PRACTICES TO IMPLEMENT IN UTILITIES

The project also focused on identifying methods that are being successfully used by out-of-industry organizations to recruit, train, and retain employees. The successful strategies presented in this report section can be used by utilities to address their unique practice needs.

A survey of recruitment, training, and retention methods in use by industries other than the water/wastewater utility industry provided many strategies that could be tailored to the utility
A survey of recruitment, training, and retention methods in use by industries other than the water/wastewater utility industry provided many strategies that could be tailored to the utility industry. Four hundred and seventeen organizations responded to a survey during the months of April through July 2007 on their recruitment, training, and retention practices. A profile of survey respondents is shown below in Table 2-1.

Table 2-1. Demographics of Out-of-Industry Survey Respondents

<table>
<thead>
<tr>
<th>Industry</th>
<th>N</th>
<th>Size (Sales $)</th>
<th>N</th>
<th>Employees</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Utilities</td>
<td>14</td>
<td>Under $1 mil</td>
<td>28</td>
<td>Under 100</td>
<td>226</td>
</tr>
<tr>
<td>Printing, Publishing and Related Ind.</td>
<td>16</td>
<td>$1,000,001 - $5 mil</td>
<td>79</td>
<td>101 - 500</td>
<td>217</td>
</tr>
<tr>
<td>Construction</td>
<td>16</td>
<td>$5,000,001 - $10 mil</td>
<td>65</td>
<td>501 - 5000</td>
<td>57</td>
</tr>
<tr>
<td>Social Services, Pub. Admin</td>
<td>24</td>
<td>$10,000,001 - $50 mil</td>
<td>162</td>
<td>5001 or more</td>
<td>4</td>
</tr>
<tr>
<td>Retail /wholesale Trade</td>
<td>25</td>
<td>$50,000,001 or more</td>
<td>129</td>
<td>No answer</td>
<td>41</td>
</tr>
<tr>
<td>Professional Services</td>
<td>61</td>
<td>TOTAL RESPONDENTS</td>
<td>504</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other Services</td>
<td>58</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Advanced Manufacturing:</td>
<td>40</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manufacturing: Other</td>
<td>191</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>59</td>
<td>TOTAL RESPONDENTS</td>
<td>504</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Location</td>
<td></td>
<td>North East</td>
<td>41</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>South East</td>
<td>151</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>West</td>
<td>23</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Midwest</td>
<td>289</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Employers Association Survey 2007

KEY SURVEY FINDINGS

Key survey findings point out the interrelated-nature of recruiting, training, and retaining in an organization. The research results support the conclusion that:

“Organizations that spend the necessary time and effort to manage effective recruiting strategies are likely to have employees who are amenable to training, learn what is required on the job, and stay with the company. Scrimping on any one of these employment practices will have a negative impact on the others.” (see Appendix C, page 193).

Keys to Successful Recruitment

Survey results show that the most effective recruiting sources for all positions are employee referrals, internet job sites, and newspapers. The most effective recruiting sites for engineers are internet job sites, search firms, and employee referrals. Specifically related to
methods of finding qualified applicants. The percentage of respondents effectively using internet based recruiting grew from 36% in 2001 to over 50% in 2006 to 69% in 2007. Forty-six percent of respondents use search firms to find engineers (Figure 2-8).

![Effective Recruiting Sources for Engineers](image)

**Source:** Employers Association Survey 2007

**Figure 2-8. Effective Recruiting Sources for Engineers (Out-of-Industry Survey)**

For analysis purposes, survey respondents were categorized into “those who report no difficulty in retaining engineers” and “those who report some difficulty in retaining engineers”. The exact parameters of the response categories were not provided in the research summary. For those respondents reporting no difficulty in retaining engineers, universities, colleges and trade schools were cited as an effective recruiting source more often than the other category respondents. Developing relationships with schools and further use of internships can be valuable sources of applicants.

Diversity is also cited as a key recruitment factor. Establishing relationships with local, regional, and national communities that serve a variety of population groups is one way to identify a broad spectrum of recruitment pools.

As shown in Table 2-2, specific survey results related to recruitment include:

<table>
<thead>
<tr>
<th>How much difficulty do you have in finding qualified Engineers?</th>
<th>No Difficulty</th>
<th>Some Difficulty</th>
<th>Great Difficulty</th>
</tr>
</thead>
<tbody>
<tr>
<td>How much difficulty do you have in getting qualified Engineers to accept employment?</td>
<td>32%</td>
<td>60%</td>
<td>8%</td>
</tr>
<tr>
<td>Use colleges, universities, and trade schools as an effective recruiting source.</td>
<td>32%</td>
<td>21%</td>
<td>47%</td>
</tr>
</tbody>
</table>

Additional strategies used by out-of-industry organizations that result in effective recruitment include:
• Complete succession planning to avoid unanticipated vacancies
• Consider alumni employees as potential applicants
• “Grow your own” engineers by recruiting internally for engineering education candidates
• Career advancement opportunities for employees are posted on an internal web-site
• Pay competitive market salaries
• Use “image advertising” to subtly remind the public of your organization and create name familiarity
• Target foreign students with work visas as applicants
• Develop relationships with middle schools where career education frequently occurs as part of the curriculum
• Reduce the need for recruiting by improving retention
• Proactively recruit a diverse workforce
• Use multiple tools for employee selection, not just interviewing

**Keys for Successful Training**

Three factors were identified by the research as key to successful training in out-of-industry organizations. Those are effective orientation and onboarding, use of various training methods to match multiple learning styles, and developing a learning culture. Specific findings include:

**Orientation and Onboarding:** Provision of basic training in English and communication for new entrants into the work place; timely and effective orientation increases the likelihood of success.

**Training Methods:** Multiple methods are used to ensure integration of the training material. Types of methods include one-to-one instruction on the job, classroom sessions, internal and external expertise, computer-based training, and web-based training. Successful organizations assess employees prior to training through use of an assessment tool that strives to bring meaning to the knowledge and skills gap, then measure the effectiveness of training upon completion and weeks into the future to identify what “sticks”.

**Learning Culture:** Successful organizations use various methods for evaluating effectiveness of employee training (Figure 2-9).
Methods for Learning

Source: Employers Association Survey 2007

Figure 2-9. Training Evaluation Methods Used by Out-of-Industry Organizations

Keys for Successful Retention

In secondary research conducted for this project, retention of employees was cited by CEOs as their most important concern (73%). The spectrum of retention strategies and practices in use by out-of-industry organizations is presented in Figure 2-10.

Retention Strategies and Practices

Source: Employers Association Survey 2007

Figure 2-10. Out-of-Industry Retention Strategies and Practices

Research reveals that employee engagement is one factor that impacts retention in an organization by influencing an employee’s commitment to an organization (Figure 2-11). An objective evaluation of organization culture is the first step to increase engagement and empowerment. Fostering positive manager and co-worker relationships also impacts engagement.
Successful organizations also examine their approaches to compensation and benefits, the nature of the work (is it challenging?), opportunities for learning and growth, employee recognition, “trying out” positions, and work/life balance in order to institute programs specially designed to reward employees for tenure and to undertake broader initiatives to create an environment where employees want to stay employed. Survey results for this project show the majority of responses as to the difficulty of retaining engineers to be “at market” (Table 2-3).

**Table 2-3. Difficulty Level in Retaining Engineers at Market Level**

<table>
<thead>
<tr>
<th></th>
<th>Above Market</th>
<th>At Market</th>
<th>Below Market</th>
</tr>
</thead>
<tbody>
<tr>
<td>No difficulty retaining Engineers</td>
<td>13%</td>
<td>76%</td>
<td>5%</td>
</tr>
<tr>
<td>Some difficulty retaining Engineers</td>
<td>8%</td>
<td>82%</td>
<td>8%</td>
</tr>
</tbody>
</table>

Diversity-friendliness is the third key to successful retention by out-of-industry organizations. Proactively planning for demographic changes, understanding the needs and values of diverse populations, and focusing on resolving differences rather than identifying commonality are keys to a successful diversity program. Figure 2-12 shows diversity practices in use by out-of-industry organizations.
Conclusions from this secondary research are discussed in Chapter 4 of this report.

Source: Employers Association Survey 2007

Figure 2-12. Diversity Practices Used by Out-of-Industry Organizations
CHAPTER 3
PRIMARY RESEARCH

The second step of this AwwaRF research project focused on conducting primary research which consisted of two components. The first component of primary research was the creation and distribution of a survey that gathered information on a utility’s current situation and actions to address the impending shortage of Engineers and Operators. The results of this survey are shown in Appendix A.

The second component of primary research was to conduct a job interest survey in conjunction with the AWWA ACE Conference Career Fair in June 2007 in Toronto; and again at the WEFTEC Career Fair in October 2007 in San Diego. The results of these surveys are shown in Appendix B.

UTILITY SURVEY

A comprehensive survey was developed with the input and feedback of the eleven utilities participating in this project. The research team interviewed the utility participants individually to discuss the recruiting, hiring, and retaining issues experienced by the utility. Based on these interviews, the research team drafted a survey appropriate for distribution to utilities and presented the survey to the participating utilities in a web conference where it was further developed and refined. The survey was released to the public in April 2007, and 27 utilities fully completed the survey.

Utility survey questions focused on these areas:

- Utility profile and governance
- Recruiting and hiring practices
- Exit practices and results
- Current profiles of open positions for Engineers and Operators
- Training practices
- Workforce planning practices
- Knowledge management practices

Highlights of the survey results are presented in this report section (full survey questions and data are included in Appendix A). Note that several of the survey questions allowed respondents to select multiple choices.

- Most survey respondents report that their utility is not fully staffed – in some cases there was a significant variance in their current FTEs to budgeted FTEs (Figure 3-1).
Figure 3-1. Current FTEs to Budgeted FTEs Show a Significant Difference

- There is wide variance in the percent of vacancies that utilities reported they were attempting to fill. For example, the average percent of vacancies for entry level engineers that a utility is attempting to fill is approximately 10%, yet at least one utility reported attempting to fill 42% of their entry level engineering positions (Figure 3-2).

Figure 3-2. Percentage of Vacancies
• The average tenure of engineers and operators is on par with the average age of all utility employees (Figure 3-3).

![Tenure of Engineers and Operators](image1)

**Figure 3-3. Average Tenure of Engineers and Operators**

• A higher percentage of operators than engineers are eligible to retire within the next five years (Figure 3-4).

![Engineers and Operators Eligible for Retirement](image2)

**Figure 3-4. Percentage of Operators and Engineers Eligible to Retire**
Exit interview data revealed that engineers primarily leave their positions with the utility for higher salaries, while operators leave their utility position to retire (Figures 3-5 and 3-6).

**Figure 3-5. Reasons Engineers Leave Their Positions**

**Figure 3-6. Reasons Operators Leave Their Positions**
Utilities report using various methods for recruiting engineers (Figure 3-7).

Figure 3-7. Typical Methods Utilities Use for Recruiting Engineers

Salary and benefits were reported as the primary financial attractors for both engineers and operators (Figures 3-8 and 3-9).

Figure 3-8. Primary Financial Attractors for Engineers
### Reasons utilities believe Operators come to work for their organization: FINANCIAL ATTRACTORS

<table>
<thead>
<tr>
<th>Attractive Salary (Base, Overtime, Vacation)</th>
<th>Comprehensive Medical Benefits (Medical/Dental Plan, 125 Plan, drug coverage, etc.)</th>
<th>Comprehensive Retirement Package (pension plan, retirement savings plan, etc.)</th>
<th>Performance Compensation Program (incentive pay, bonus, shared savings program, etc.)</th>
<th>Educational Reimbursement Program</th>
<th>Professional Development Opportunities</th>
<th>Wellness Program (fitness club, counseling, disability coverage, etc.)</th>
<th>Low Cost of Living</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image.png" alt="Bar chart for Operators" /></td>
<td><img src="image.png" alt="Bar chart for Operators" /></td>
<td><img src="image.png" alt="Bar chart for Operators" /></td>
<td><img src="image.png" alt="Bar chart for Operators" /></td>
<td><img src="image.png" alt="Bar chart for Operators" /></td>
<td><img src="image.png" alt="Bar chart for Operators" /></td>
<td><img src="image.png" alt="Bar chart for Operators" /></td>
<td><img src="image.png" alt="Bar chart for Operators" /></td>
</tr>
</tbody>
</table>

**Figure 3-9. Primary Financial Attractors for Operators**

- Job security was reported by both engineers and operators as the primary non-financial attractor. Surprisingly, neither employee group rated a flexible work schedule as a high priority (Figures 3-10 and 3-11).

### Reasons utilities believe Engineers come to work for their organization: NON-FINANCIAL ATTRACTORS

<table>
<thead>
<tr>
<th>Job Security</th>
<th>Favorable Work Conditions</th>
<th>Interesting Work or Variety of Work</th>
<th>Diversity of Current Workforce (age, gender, ethnicity)</th>
<th>Work that is Worthwhile to Society</th>
<th>Flexible Work Schedule</th>
<th>Time-off to Volunteer (for non-profit organization)</th>
<th>Desirable Community</th>
<th>Flexible Job Position (cross-skilling, job rotation, job-sharing, etc.)</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image.png" alt="Bar chart for Engineers" /></td>
<td><img src="image.png" alt="Bar chart for Engineers" /></td>
<td><img src="image.png" alt="Bar chart for Engineers" /></td>
<td><img src="image.png" alt="Bar chart for Engineers" /></td>
<td><img src="image.png" alt="Bar chart for Engineers" /></td>
<td><img src="image.png" alt="Bar chart for Engineers" /></td>
<td><img src="image.png" alt="Bar chart for Engineers" /></td>
<td><img src="image.png" alt="Bar chart for Engineers" /></td>
<td><img src="image.png" alt="Bar chart for Engineers" /></td>
</tr>
</tbody>
</table>

**Figure 3-10. Primary Non-Financial Attractors for Engineers**
Reasons utilities believe Operators come to work for their organization: NON-FINANCIAL ATTRACTORS

- Job Security
- Favorable Work Conditions
- Interesting Work or Variety of Work
- Diversity of Current Workforce (age, gender, ethnicity)
- Work that is Worthwhile to Society
- Flexible Work Schedule
- Time-off to Volunteer (for non-profit organization)
- Desirable Community
- Flexible Job Position (cross-skilling, job rotation, job-sharing, etc.)

Figure 3-11. Primary Non-Financial Attractors for Operators

- Survey responses show that utilities provide training opportunities for engineers and operators beyond required certification training (Figures 3-12 and 3-13).

Training support for Engineers:

- Required training to maintain Professional Engineer (PE) certification
- Optional skill training program
- Optional leadership or management training program

Figure 3-12. Additional Training Opportunities Provided to Engineers
Figure 3-13. Additional Training Opportunities Provided to Operators

Survey results also indicate that less than half the engineers take advantage of optional training and even fewer operators use this benefit (Figures 3-14 and 3-15).

Figure 3-14. Percentage of Engineers Taking Advantage of Optional Training Opportunities
Figure 3-15. Percentage of Operators Taking Advantage of Optional Training Opportunities

- Although utilities report using various methods to track their organization’s workforce changes (Figures 3-16 through 3-22), reported actions do not support that response.

Figure 3-16. Methods Utilities Use to Prepare for an Aging Workforce
Formal, quantitative “gap analysis” is conducted to identify future staffing needs of utilities.

Figure 3-17. Future Staffing Needs

Utilities use formal Succession Planning to build a pool of candidates qualified for key leadership/management positions that will be vacated in the next five years.

Figure 3-18. Utilities Currently Using Succession Planning
Utilities use Replacement Planning to identify specific individuals to replace key leadership/management positions that will be vacated in the next five years.

We provide formalized development opportunities such as executive coaching, leadership development programs, or mentoring programs to prepare employees for future leadership positions.

Figure 3-19. Utilities Using Replacement Planning

Figure 3-20. Utilities Using Formalized Development Programs
We have a Knowledge Management Program in place to capture critical knowledge from employees eligible for retirement in the next five years.

Figure 3-21. Utilities with Knowledge Management Programs

Our workforce planning strategy is tightly linked to our organization’s overall strategic direction.

Figure 3-22. Utilities Linking Workforce Planning to Strategic Direction

- A majority of the respondents expressed confidence in the data they reported in the survey, indicating that the majority of the utilities completing the survey have practices in place to track organization data (Figure 3-23).
Figure 3-23. Utility Confidence Level in Data Reported

The initial conclusions from the survey data indicate that the majority of utilities responding do not have a comprehensive workforce strategy or program in place and are not using “best practices” to support workforce development.

Several questions were raised by the utility survey results:

- Is lack of action in beginning a workforce planning project by the utilities due to not having a sense of urgency, not knowing what to do, or “not my problem” thinking?
- Less than one-fourth of the utilities that were invited to complete the survey actually did. Are the non-responsive utilities in a better or worse situation? Do the non-responsive utilities lack data on workforce changes?
Job Fair Survey

The second component of primary research was the job industry survey. The research team held a “reverse job fair” in conjunction with the AWWA Career Fair at the June 2007 AWWA ACE conference in Toronto and again in October 2007 at the WEFTEC conference in San Diego (sample flyer shown). In this reverse job fair, students were asked to complete on-line survey providing their opinions regarding working at a water utility. Participants were also asked to rate (from 1 to 10) the factors that are important to them in a job. In addition to asking students to complete this survey at the AWWA ACE Career Fair and at WEFTEC, additional surveys were collected from attendees represented by both AWWA’s and WEF’s Young Professionals Committees (YPC). These surveys were completed following the conferences.

In this report section, the two sets of data are presented separately. Thirty-nine surveys were completed at the ACE job fair by students and twenty-eight completed surveys were returned by members of the AWWA YPC. Forty surveys were completed at WEFTEC job fair with twenty-four completed by the Young Professionals. The two sets of data represent differing profiles of respondents: the data gathered at the job fair in Toronto is representative of respondents in that geographic area. The same is true of the data gathered in the job fair in San Diego. On the other hand, the data gathered through the YPCs is representative of respondents across the United States.

The following charts summarize some of the data collected. Full results can be found in Appendix B.

- Fifty-four percent of the AWWA Job Fair respondents report being full-time students with 66 percent reported at WEFTEC; 93 percent of the respondents for the AWWA
YPC report working in the water/wastewater industry in either the public or private sector compared to 91 percent of the WEF YPC respondents (Figures 3-24 and 3-25).

**Figure 3-24. Percentage of Young Professionals Working in Utility Industry**
Figure 3-25. Percentage of Private vs. Public Industry Respondents
Seventy-four percent of the AWWA YPC respondents have had previous professional work experience in the water/wastewater industry compared with 73 percent of WEF YPC respondents. Job Fair data show 43 percent of the AWWA YPC respondents have also worked in the water/wastewater industry in professional positions; the same percentage is true for WEF YPC respondents (Figure 3-26).

Figure 3-26. Previous Work Experience in the Utility Industry
When asked about military experience, one-hundred percent of both YPC groups had none. The kiosk shows one percent of the AWWA respondents with military experience in the reserves and one percent of the WEF YPC respondents with military discharge (Figure 3-27).

**Figure 3-27. Military Experience of Respondents**
• Interestingly, 89 percent of the AWWA YPC respondents were over 26 years of age, while only 46 percent of the kiosk respondents were in this age category. Fifty-one percent of the Job Fair respondents were between the ages of 21-25. Results from WEF YPC respondents and WEFTEC kiosk respondents were very similar to AWWA (Figure 3-28).

**Figure 3-28. Majority of YPC Respondents Age Twenty-Six and Older**
In both data sets for AWWA, the female population was greater than the male population with 64 percent female in the YPC respondents and 59 percent female in the kiosk respondents. On the other hand, the WEF YPC respondents showed 58 percent male population and the kiosk results showed 42 percent male population (Figure 3-29).

Figure 3-29. Gender of Respondents
AWWA YPC respondents were primarily of white ethnicity/race (89 percent). Kiosk responders were evenly divided between White and Asian/Pacific Islander. White ethnicity/race was also primary in the WEF YPC results (Figure 3-30).

**Figure 3-30. Ethnicity/Race of Respondents**
The majority of AWWA and WEF YPC respondents were born in the U.S. This is true of the WEFTEC kiosk responders as well. Kiosk responders at AWWA evenly represent the United States and Canada. This result is not surprising since the AWWA career fair was held in Toronto (Figure 3-31).

Figure 3-31. Birth Country of Respondents
Survey respondents were asked to rate the factors that are most important to them in a job (1-10 with 10 being the most important). The job factors and ratings are presented below in Figure 3-32.

Figure 3-32. Respondents Rating of Important Job Factors
In all data sets, the top three factors most important to the survey respondents (both kiosk and YPC) were:
- Work that enables me to learn and grow (78 responses)
- Work that is enjoyable (74 responses)
- Work that is personally stimulating (61 responses)
CHAPTER 4
PROJECT FINDINGS

This report section presents the findings and observations on the research.

PRIMARY RESEARCH VALIDATES LABOR CRISIS SITUATION

The findings of the primary research (utility survey and job fair survey) lead to the following observations related to workforce planning:

Workforce Issues are Reaching Critical Proportion in the Utility Industry

Figures 3-1 and 3-2 show that a majority of utilities report they have been operating below their funded staffing level for some number of years – a factor that directly impacts training and retention of staff (overworked, no training time available, overtime budgets above acceptable limits, etc.). Figures 3-12 through 3-15 validate that utility employees are not taking advantage of training that is offered and for which employees will be reimbursed. This could indicate that utilities are operating in a vicious cycle of managing daily priorities while lacking the capacity to address workforce issues that could alleviate the stress of this mode of operation. It could also indicate a lack of understanding on the best way to proceed in addressing workforce issues.

Operators are the Most Urgent Staffing Need That Utilities Must Address

As shown in Figures 3-3 and 3-4, more Operators than Engineers are eligible to retire within five years which reinforces Operators as the most urgent staffing need that utilities must address.

Utilities Do Track Indicators of Workforce Changes

Figure 3-16 shows that responding utilities do track some indicators of workforce changes. However, considering the responses to specific workforce development activities shown in Figures 3-17 through 3-21, the majority do not appear to be taking a systematic approach to work force planning and the pending workforce shortage.

Workforce Planning is Not Yet Viewed as “Strategic” Within Most Organizations

Figure 3-22 indicates that workforce planning is not yet viewed as “strategic” within most organizations and is not given the same attention as regulatory and infrastructure issues – even though workforce planning directly addresses sustainability of the organization.

New Workers and Students Have the Same Needs in a Job

There is an interesting link between the priorities of students just beginning (or soon beginning) the job search (they stated they are seeking work that enables them to learn and grow, is personally stimulating, and enjoyable – see Figure 3-32), young professionals with a few years
in the utility workforce (has the same needs – see Figure 3-32), and the utility survey data that report Engineers leave their organizations over pay issues (Figures 3-5 and 3-6). For utilities to increase employee retention rates, this link must be further explored asking questions such as: Does a values shift occur? Does the reality of the need for money to cover our cost of living impact values? Are the young professionals who want more financial incentives still performing interesting and personally stimulating work? Does the retirement package tie an employee to the utility until a position with better pay and retirement appear? There does not appear to be a different set of values represented in the student responses from the Job Fair in Toronto (with the respondents being primarily Canadian) against the student responses at the San Diego Job Fair.

Findings from both the primary and secondary research call for creative thought and action on the part of utilities if they desire to be ahead of the coming workforce shortage.

SECONDARY RESEARCH INDICATES THE POTENTIAL WORKFORCE IS THERE; SYSTEMATIC ACTION BY THE UTILITY IS REQUIRED TO ATTRACT WORKERS

Data presented in Figures 2-1 through 2-6 reveal that potential applicants are out there waiting to be courted into the utility industry (High School, Community College and traditional 4-year college graduates, retired persons, displaced workers, and veterans), but that work is required by utilities and the general industry to successfully recruit applicants into the organization, and then more work is required to keep them there once they commit. The research points out the interrelated nature of recruiting, training, and retaining, indicating that if an organization spends the necessary time identifying and selecting the right applicants, and if challenging work is continually provided to employees, then retention is less an issue for the organization. Out-of-industry research supports a multi-channel, systematic approach to addressing workforce issues indicating that a single strategy for recruiting and retaining engineers and operators will not produce effective results.

The secondary research provided examples of recruiting, training, and retention methods in use by out-of-industry organizations that must be packaged into a systematic approach to fit a specific utility’s needs. Research findings indicate the following actions may improve a utility’s success in recruiting and retention:

- Expand partnerships with universities to provide internship opportunities that result in real learning for the intern and may lead to their interest in future employment.
- Actively partner with middle schools to provide exposure to water industry careers at an early age.
- Target the right markets when recruiting by casting a broad net (national/international) for engineers; and local or regional recruiting for operators.
- Be creative in identifying potential candidates in a geographic area by monitoring plant closing databases, participating in job fairs aimed at soon-to-be veterans; partner with local affinity groups for training purposes, e.g., AARP.
- Engage in passive marketing to improve the name recognition of your organization and develop a broader candidate pool for selection (and make sure your organization’s culture is consistent with the market image).
- Creative initiatives can bring results – e.g. “grow your own” engineers by identifying the technicians with strong potential and funding their education. This can also be applied to community college students who are seeking an employer who will assist
with funding further education to obtain an engineering degree. Investment brings commitment and reduces the need for future recruiting.

- Examine your organization’s current approaches to recruiting and re-implement strategies in a way that produces the desired result. For example, bonuses associated with referrals, Internet and Intranet sites that utilize qualification matching software, etc.
- Conduct formal succession planning or workforce planning to identify internal candidates for grooming into an advanced role in the organization and reduce the need for future pools. This is commonly used in out-of-industry organizations.
- As part of a larger “culture overhaul” implement programs that teach acceptance and celebration of diverse populations in order to create a culture of welcome and acceptance for non-mainstream applicants (foreign students, Asian/Hispanic women, disabled workers, older workers, etc.).
- Training in utilities must be characterized as integral to the longevity of the organization, delivered in multiple formats to accommodate different learning styles, and its effectiveness assessed at multiple intervals (immediately, in 3 weeks, in 3 months, etc.). Building internal skill training programs to provide employees with career options other than supervisory or manager positions can improve retention. Begin this with the “on-boarding” process.
- Fostering employee engagement is key to retention and impacts key utility performance indicators (customer service, profitability, etc.). Learn about engagement, how to measure it, why it is significant, how it leads to improved performance on key indicators.
- Evaluate policies for training reimbursement. Create clarity about purposes of training and what it prepares the trainee for in the future.
- Compensation matters. It levels the playing field for competing industries. Compensating competitively may be an issue that utilities will be unable to address. Many report paying at or below market – a practice that will impact their competitive position as the labor pools shrink.
- Use creative methods of hiring such as contracting with consulting and contract worker firms to supplement in-house resources.

In order to provide a systematic approach to workforce planning, utilities must consider where responsibility for workforce planning resides – is it all the responsibility of Human Resources? Do organization unit managers have a role to play? Do executives initiate the planning effort? Is workforce planning a partnership between Human Resources and Operational managers? Responding to these questions is a critical step toward defining an integrated workforce planning process for a utility.

**COLLABORATIVE OPPORTUNITIES EXIST TO PROVIDE UNITED FRONT FOR INDUSTRY ACTIONS**

Based on the data, opportunities exist for utilities to collaborate with or work through associations that are already utility advocates such as AWWA, WEF, or NACWA to facilitate industry-wide changes to address the pending workforce crisis. There are many areas suited to collaboration; specific approaches will depend on the mission of the association, breadth of the
issue, governance of the utility, and other factors. Areas of concern within utilities that may support opportunities for collaboration could be:

- The development of new approaches to retirement such as phased retirement programs or part-time work programs for retirees. This is an area where organizations such as the state chapters of AWWA and WEF may play a role since a change to retirement plans could require legislative action at the state level.
- Media campaigning to brand the utility industry or a specific utility. There may be paths for the industry to advertise the environmental attractors and the opportunities that young professionals have to do attractive and meaningful work. Opportunity also exists to turn the press into an advocate for the industry and less a watchdog reporting isolated negative events.
- Changes in Civil Service and City hiring practices that support a broader search process for potential applicants, accommodate language diversity in the evaluation process, quicken the pace of the process when excellent candidates are identified, etc. This may be a strategy for an individual utility; however, an industry model may be required to promote progress at the individual level.

**ISSUES CONSPIRE TO CREATE PROBLEMS FOR UTILITIES**

Many factors conspire to keep utilities from developing a successful workforce plan. One is having not been in the hiring mode for such a long period of time (the era of lean operations). Other reasons include not knowing how to take the first step, and even an attitude that “it is not my problem (because I won’t be here).” Utilities need to learn anew the systematic recruiting and selection methods to realize hiring success. Out-of-industry research supports a “program” approach, not a single method or process for hiring (see Figure 4-1).

Since the research indicates that workforce strategies are not tied to overall organization business strategies within the utility, it appears that utility managers may not be attuned to the pending workforce crisis, do not have a clear plan to prepare for it, or may be narrowly focused on a single aspect of maintaining workforce continuity.

The utility industry may need to re-think the employment lifecycle and target specific activities at various phases that promote training and retention of existing employees. This concept of proactively managing the employment lifecycle is beginning to be more common in out-of-industry organizations. Figure 4-1 conceptualizes the way out-of-industry organizations are taking action ahead of or in response to “at-risk” junctures in an employee’s career. The risk may develop from a competing employment offer that has attractors that are meaningful to the employee, or from a long period of time without challenging work assignments, or lack of career advancement that shifts an employee’s attention to other activities essentially creating a disengaged employee. Using retention factors such as training, work assignment, manager assignment, or compensation and benefits to manage the employment lifecycle will result in lengthened extended tenure for at-risk employees.
Figure 4-1. Research Indicates That Out-of-Industry Organizations Proactively Manage the Career Life Cycle
CHAPTER 5
STRATEGIES

INTRODUCTION

This report section presents strategies identified through the project research that have proven effective for recruiting, training, and retaining employees. As the research team sifted through the learning that occurred during the research, broad categories of targets and action emerged. For example, utilities may choose to focus on a specific pool of potential employees as depicted below:

New Pools
- Military Veterans
- Displaced Workers
- Ethnic Groups
- Retirees

Existing Pools
- Schools and Universities
- Other industry organizations (utilities, vendors, consultants, educators, manufacturers, regulators)
- Other industries
- Current employees

Each reader of this report may review the list and select a different starting place—a factor that is highly dependent on reader’s organization’s current situation with regard to workforce sustainability.

Strategies also appeared to group around a specific focus—either on a practice, on raising awareness of workforce needs, or on policies and regulations that impact workforce sustainability. Some strategies are implementable by a single utility, others require action at the industry level or action by a group of utilities working together to implement a strategy (see Figure 5-1).

Figure 5-1. Strategies Can be at Various Levels and Applied Utility-Specific or Industry-Wide
All strategies require careful assessment and planning before being implemented; and all should be evaluated for highest level of return for your organization.

FIRST UNDERSTAND YOUR ORGANIZATION’S CURRENT SITUATION

Prior to identifying and focusing on the implementation of any strategy presented in this report, it is critical that an organization understand their current situation with regard to workforce development. The process depicted in Figure 5-2 identifies a 4 step process a utility can use to address workforce needs.

![Figure 5-2. A Four-Step Process Used to Address Utility Workforce Needs](image)

To briefly describe the steps:

**Step One:** SCAN the current environment to determine workforce needs and drivers based on your utility business strategy.

**Step Two:** ASSESS your current workforce practices against most effective workforce practices to identify what you need to be doing for future operational sustainability.

**Step Three:** PLAN a program specific to your unique situation to implement effective workforce practices, prioritize actions, and identify performance measures.

**Step Four:** IMPLEMENT the program, measure strategic outcomes, and adjust actions as business strategies change.

Understanding your organization’s current status in this 4 step process is the key to knowing which strategies described in this report section will most effectively move your organization toward workforce sustainability.

Strategies are sorted into recruiting, training/retaining, and employee life cycle and are presented with both utility and out-of-industry examples of successful uses of the strategy. Strategies can be aimed at new or traditional pools of potential employees. Some strategies can
Strategies are presented below. Recruiting strategies are presented first, followed by development/retention strategies, and lastly by employee life cycle strategies. Each strategy is presented by name, target job (engineer or operator), a description of the strategy and examples of successful use of this strategy either internal or external to the utility industry.

An interactive “mini-assessment” of a utility’s workforce practice is included on the CD accompanying this report. The mini-assessment relates each strategy presented to an effective workforce practice statement. A utility can rate its current practice against the effective workforce practice, and then be referred to a strategy that will improve the utility’s effectiveness in that practice area. Use of the tool is explained in the “How to Get Started” discussion in the Conclusion of this report.

RECRUITING STRATEGIES

A. Educational Institution Relationships

PURPOSE: RECRUITING/LONG-TERM
TARGET JOB: BOTH ENGINEERS AND OPERATORS
DESCRIPTION:

This strategy can take many forms, all focused on building long term relationships with schools and universities which requires nurturing and maintenance by the operations group of the recruiting organization. A few approaches include:

- Actively partnering with middle schools and high schools to provide exposure to water industry careers at an early age through programs such as summer science camps, sponsoring “water week” for the science classes in an area high school by providing curricula and instructors for the week, or partnering for field trips that include real learning.

- Partnering with universities and community colleges to provide internship opportunities that foster real learning for participants and provide the student with exposure to jobs in the utility industry and provide the utility with exposure to a potential future employee. A recent article in Journal AWWA by AWWA’s Workforce Strategies Committee presented successful ideas for internship programs (Mirvis et al., 2008).

- Partnering with school placement offices specifically to tap into potential hiring pools so that the utility has a pre-established vehicle for candidate interviews. This requires consistent participation by the utility in job fairs and candidate interviewing even during times when the utility may not have open positions.

- Establishing relationships with specific faculty members. This can be for recruiting of job candidates or recruiting faculty members to participate in learning events such as science camps.

Examples of Use of Strategy:

A southeastern water/wastewater utility implemented an educational facility in 2003 that provides elementary and middle school students with hands-on learning experience.
A large wastewater utility in the west implemented a variety of programs that involve hands-on activities, out-of-classroom excursions, and specific projects to build interest in middle school and high school students for careers in water quality and other environmental areas. Specific programs include Sewer Science, Tours, Think Earth, Think Watershed, Desert Lab Partnership, and World Water Forum. In most programs, the utility provides the program materials and equipment, leads the programs, and covers transportation costs. Following the program, fifty percent of the participants expressed an interest in water quality careers.

The utility also implemented a fellowship program for undergraduate students to provide scholarships for engineering students.

Environmental Engineers of the Future (E²F) is a coalition of private engineering consulting firms and public agencies formed to increase the number of master’s students in environmental engineering. Eight students were funded in 2006/7 and eleven selected for 2007/8. Students may attend one of 54 universities with nine funding partners committed to the program. A three-year work commitment for one of the funding agencies absolves repayment of tuition.

A west coast water/wastewater utility is in a unique position of not needing to formalize an internship program as they enjoy a steady stream of students from area universities as interns. They offer competitive salaries and an outstanding variety and depth of work experiences. Six of the twenty interns utilized by the engineering division over the last 10 years have become utility employees, and more than half of their fifty design engineers were interns before becoming full-time employees. Typical intern assignments are:

- Assist with piping changes to existing systems
- Perform phone surveys in support of studies
- Assist with site field measurements for designs
- Perform computer modeling assignments for hydraulics
- Develop websites
- Assist with programmable logic controller programming
- Develop screens for human-machine interface
- Assist in preparing designs for power distribution, lighting, motor control, process control telemetry, etc.
- Assist in preparing technical specifications

A city in the Pacific Northwest is the only municipal organization to date that has utilized the Career Fair at the American Water Works Association ACE to advertise the work of their divisions. This is a unique opportunity to reach hundreds of potential employees already working in or expressing an interest in a career in the utility industry.

A southeast coastal electric and water utility uses a co-op program to enable college level students to alternate semesters of academic study with paid, career-focused semesters of work. Common disciplines studied in the program include engineering, information technology, chemistry, natural science, finance, and general business. This is just one initiative in the utility’s Workforce Readiness strategy. As part of the co-op program, they support the INROADS Program, a non-profit dedicated to develop and place talented minority students in business leadership. The utility views this program as a pipeline for their future workforce.

This same southeast coastal electric and water utility has developed what could be referred to as a “feeding system” of potential employees for their organization. They accomplished this by developing relationships and programs at all school levels, middle school,
A major manufacturing company in the north central states developed an effective recruiting strategy by building strong relationships with a limited number of colleges and universities. They use line managers (proven to have greater credibility) to conduct interviews and seek feedback from recruits on their process.

B. Image Building

**PURPOSE:** Recruiting/Long-Term

**TARGET JOB:** Both Engineers and Operators

**DESCRIPTION:**

This strategy can be passive or active. The overall strategy is to increase the positive name recognition of your utility with the general public. This can result in potential employees actively seeking employment with your organization based on reputation.

An example of passive image building is advertising on buses, billboards, the internet – places where name recognition is created – or sponsoring community events such as foot races or neighborhood fairs.

An example of active image building is participating in community job fairs, or providing public education seminars on topics such as water conservation or water quality – all are opportunities to actively advertise the environmental significance of your organization’s work.

**Examples of Use of Strategy:**

A City in Canada has installed signs on city busses to build awareness of local government.

ConstructMyFuture.com is building the image of the construction industry by targeting scholarships, posting profiles of people in the industry that include their “story” of entering the construction field, providing the Construction Challenge for high school teams to compete in dialog, design, and building of a construction project and many other activities with advertising style targeted to high school students.

The Gap and Apple are both good examples of image building. Advertisements for The Gap display an image of fun and fast-paced activity to attract customers and create this same image in the minds of applicants before they even seek a position.

A university city in the southwest implemented a multi-faceted recruitment program that includes creating a high profile among young people. Job recruiting is the responsibility of two students hired by the City. They staff a booth at job fairs and attend a wide variety of local events, from homecoming festivities to local bike races and fun runs. An advantage is that the two students know what is important to that age group.
C. Utilize Alternative Sourcing Methods

PURPOSE: RECRUITING/SHORT-TERM
TARGET JOB: BOTH ENGINEERS AND OPERATORS
DESCRIPTION:
This strategy can be used for positions that are difficult to fill, as a method to supplement in-house resources, or to meet an immediate need on a temporary basis. It can also be used to assess an employee prior to retaining them as a regular employee.

With regard to the current workforce shortage this is an ideal method to re-hire employees retired from the utility who may have unique knowledge critical to your organization and/or as a mentor to a newly hired or promoted employee.

This strategy is also an opportunity to partner with organizations such as AARP that implement training programs for low income persons 55 and over. This could be an ideal source for operators.

Examples of Use of Strategy:

A large southwestern city implemented a program that uses soon-to-be-retired and retired employees in a training capacity to pass on their knowledge and abilities to the person replacing them in the position. A key to program development was obtaining approval to contractually hire former employees as independent vendors to provide specific duties, including training. This program has been in place for several years at the city.

D. Target New Pools

PURPOSE: RECRUITING/SHORT TO MEDIUM-TERM
TARGET JOB: BOTH ENGINEERS AND OPERATORS
DESCRIPTION:
This strategy can be applied locally or on an industry-wide basis. On a local level, a utility can monitor plant closing databases (make use of BLS websites and other specific plant closing sites), participate in job fairs aimed at soon to be veterans, or partner with a local affinity group such as AARP for training purposes.

This also includes advertising in aggregate-specific publications such as Hispanic newspapers and journals, publications from organizations such as the National Society of Black Engineers or the Society of American Military Engineers, and other publications targeted at specific population groups.

Examples of Use of Strategy:

The Evergreen Chapter of the American Society for Public Administrators hosted the first ever Washington State Public Service Career Fair in conjunction with Puget Sound area local, county, state and federal government agencies. The goal for the event is to connect prospective employees with viable opportunities and to raise the general public’s awareness about critical workforce issues facing all levels of government. Several workshops such as how to navigate the federal and state application process, tips on interviewing, and a panel discussion on the significance of public service were all part of this Career Fair.
E. “Grow Your Own” Program

PURPOSE: RECRUITING, DEVELOPING AND RETAINING/LONG-TERM
TARGET JOB: ENGINEERS
DESCRIPTION:

This strategy focuses on growing your own engineers by identifying the current technicians in your organization with strong potential for development and funding their education to complete their engineering degree.

This can also be applied to community college students. A utility can advertise, assess, and retain current students with an agreement to fund their further education to obtain an engineering degree in exchange for an employment commitment.

Examples of Use of Strategy:

A county in the Pacific Northwest has proposed implementing a ‘grow your own’ program for in-house Engineering Technicians who want to complete their engineering education. The program will include tuition reimbursement with a specific time commitment to remain employed with the County, and reimbursement for Engineer in Training and Professional Engineering exams.

A mid-western water/wastewater utility is advertising internally to encourage city employees to apply for their certification program. They used open houses to explain the licensing and skills needed, provided a tour of the facilities, and answered questions. They are going further and providing in-house “Classes in Water Treatment” to prepare employees for licensing in May 2008.

F. Hiring Policy, Regulation, Practice Changes

PURPOSE: RECRUITING/MEDIUM TO LONG-TERM
TARGET JOB: BOTH ENGINEERS AND OPERATORS
DESCRIPTION:

This strategy focuses on changing Civil Service, City, and Utility hiring policies to support broader search processes, accommodate language diversity in the evaluation process, and quicken the pace of the hiring process – essentially to address any issue that deters hiring and promotion in an objective and timely manner.

Another aspect of this strategy is changing state or federal laws and regulations that impact the industry such as changing laws to improve certification reciprocity between states. Frangione and Good (2007) found that sixty-eight percent of utilities make it difficult to hire certified operators from another state, frequently providing them with a lower grade certification. Addressing these issues at a state and federal level will increase the mobility of operators.

Examples of Use of Strategy:

A special operating district in the Pacific Northwest has honed their hiring process to the point that a senior management position was recently filled in eight weeks (which even included an extended posting period). The hiring process included these steps for six candidates:
standard background and license checks, a personality assessment, reference checks, a job related physical that included drug screening, a one-day assessment center, and an executive interview.

A southeast coastal electric and water utility implemented a plan that allows employees to extend their retirement date up to five years, and an ordinance that allows rehiring retirees. This organization also engages their employees in a dialogue to understand the real issues that prevent internal promotions, speedy hiring, etc. and address those at the right level.

G. Web-Based Techniques and Talent Management Software Tools

**PURPOSE:** RECRUITING/SHORT TO MEDIUM-TERM  
**TARGET JOB:** BOTH ENGINEERS AND OPERATORS  
**DESCRIPTION:**

This strategy comprises several practices that will benefit those utilities that may not be currently using them. They include:

- Post jobs on the utility’s website accompanied by an electronic application process.
- Use Internet recruitment sites such as Monster.com, HotJobs.com, CareerBuilder.com or DICE.com that are highly viewed by Gen X and Y job seekers.
- Use qualification matching software to filter qualified applicants. This can be used by a utility or a utility may use a website that provides this service.

Boltz and Johnson (2007) from CH2MHILL learned that Young Professionals (average age of 30 in their study) rated an Internet job posting as the 4th most popular method of locating a job.

Havard, Vieaux and Keck (2007) found that the Internet is the most popular source of information about a company. Completeness and professionalism of the site should facilitate the recruitment process.

*Examples of Use of Strategy:*

A global mining firm installed technology for talent management. Disparate recruiting processes were integrated into an integrated global system with regional recruiting teams using an e-recruiting module to find and track qualified applicants. This software is also used internally to identify skills and make the best use of existing talent in its global operation.

H. Employee Referrals

**PURPOSE:** RECRUITING/SHORT TO MEDIUM-TERM  
**TARGET JOB:** BOTH ENGINEERS AND OPERATORS  
**DESCRIPTION:**

This strategy provides a reward or bonus for current employees who recommend candidates for engineering and operator positions. Out-of-industry research shows incentive payments make this strategy more useful.

*Examples of Use of Strategy:*

Multiple organizations have implemented this strategy both in and out of the utility
industry. Incentives are often split with a partial award when an employee is hired, and the remaining award after the employee completes one year of employment.

I. Search Firms/Employment Agencies

**PURPOSE:** RECRUITING/SHORT TO MEDIUM-TERM  
**TARGET JOB:** ENGINEERS  
**DESCRIPTION:**  
This strategy was ranked second most effective by out-of-industry firms that were surveyed for this research. Use of a search firm or agency allows a utility to identify a broader pool of candidates for review and often allows hiring on a contract basis for a limited period of time while the utility reviews the work of the employee.

*Examples of Use of Strategy:*

Utilities frequently use this strategy when seeking to fill an executive level position. This practice should be expanded to include use for Engineer positions.

J. Rehiring Retired Utility Employees

**PURPOSE:** RECRUITING/SHORT TO MEDIUM-TERM  
**TARGET JOB:** BOTH ENGINEERS AND OPERATORS  
**DESCRIPTION:**  
This strategy was referenced in the discussion of using alternative sourcing methods. A utility can rehire recent retirees in a capacity specifically to mentor younger employees and capture/transfer knowledge that is valuable to the organization. This strategy can be used for a specific engineer or operator position or as a strategy within an overall knowledge retention program. Organizations should take care to ensure the retiree has both the knowledge that is needed as well as the disposition and skills to teach and mentor younger employees.

*Examples of Use of Strategy:*

A large southwestern city implemented a program that uses soon to be retired and retired employees in a training capacity to pass on their knowledge and abilities to the person replacing them in the position. A key to program development was obtaining approval to contractually hire former employees as independent vendors to provide specific duties including training. This program has been in place for several years at the City.

K. Redesign Utility Culture

**PURPOSE:** RECRUITING/LONG-TERM  
**TARGET JOB:** BOTH ENGINEERS AND OPERATORS  
**DESCRIPTION:**  
This long-term strategy is significant for attracting and retaining employees who are generationally or culturally different than your current employee group which is an eventual reality for every utility. It is critical to make your organization a place employees want to stay, a
place with values and projects that attract the younger generation of workers, and a place that promotes cultural diversity – not just as mandated by a City diversity program, but in the attitudes and actions of employees.

Utilities must implement programs to teach acceptance and celebration of diverse populations in order to create a culture of welcome and acceptance.

Utilities must also provide challenging, significant work, make better use of teams in solving problems and completing projects, and provide real opportunities for input and contribution by young employees. All of these actions represent the values held by Gen X and Y employees.

**Examples of Use of Strategy:**

The nation’s largest provider of eye care wellness benefits is transforming their culture with these lessons learned:

- Hire for attitude, train for skills
- Set high expectations, tie compensation to company performance
- Actively develop employees (they have higher than a 40% internal promotion rate)
- Foster learning from mistakes to improve performance, not cast blame
- Inspire innovation by eliminating fear
- Implement “People First Awards”
- Don’t fear failure
- Cultivate a culture of respect and inclusion (everyone on a first name basis, employee focus groups, open door policy, in-touch day)
- Recognize and inspire employees with fun activities!
- Support employees need for balance through flexible scheduling, telecommuting, paid volunteer time, market-leading benefit packages
- Give back to their community
- Engagement through manager and leader forums is a key component; expect everyone to lead.

A southwestern university city implemented a recruitment program that includes changing their organization culture and emphasizing the benefits of working in the public service arena, benefits such as a work environment that is not as cut throat as private sector jobs, an opportunity to make a difference, monthly employee meetings to discuss whatever is on employee minds, and the fun events associated with a family atmosphere.

**L. Advocate at State and Federal Level for Workforce Initiatives**

**PURPOSE:** Recruiting/Long-Term
**TARGET JOB:** Both Engineers and Operators
**DESCRIPTION:**
Identify state and federal agencies that can impact the availability of future candidates for utility positions through legislative changes and education programs. Find ways to partner with these organizations to address workforce planning issues.
Examples of Use of Strategy:

A southeast coastal electric and water utility has identified external resources that support their workforce planning needs, such as Florida’s Water Future Workforce Subcommittee, the Florida Energy Workforce Consortium, The Center for Energy Workforce Development and the Florida Banner Center for Energy. The utility is committed to leading a state effort to create a Florida Banner Center for Water in 2008.

An additional word on recruiting strategies: One of the most effective strategies for meeting future workforce needs is to improve your organization’s retention capabilities. This creates a more attractive workplace for current and future employees. A low turnover rate and a high level of employee engagement are measures that appeal to a next generation worker that is considering your organizations for potential employment. A utility that significantly improves retention should advertise those data in branding their organization, when participating in job fairs - essentially in any recruiting event.

DEVELOPMENT/RETENTION STRATEGIES

Retention is one of the most critical challenges faced by an organization. As cited in secondary research for this project, seventy-three percent of CEO’s identify retention as their most important concern. This becomes an even greater concern with the shifts that are occurring in today’s labor force. The smaller number of Gen X and Y workers available to fill openings created by Baby Boomers adds additional pressure on an organization to retain qualified employees. Employees begin to feel more confident about their opportunities in the job market in today’s economy and may be more likely to leave an organization to pursue those opportunities.

In this report, strategies for development and retention are considered in partnership because developing employees is key to keeping them engaged and committed to your organization. Development/retention strategies are presented in the same format as were recruiting strategies.

A. Competitive Pay Structure

**PURPOSE:** RETENTION/LONG-TERM  
**TARGET JOB:** BOTH ENGINEERS AND OPERATORS  
**DESCRIPTION:**

This is a strategy that is difficult for many utilities to implement, particularly those governed by a Civil Service or City Human Resources group. Research for this project showed that out-of-industry competitive pay is a given – a factor that levels the playing field. In other words, organizations are not competing for employees on the basis of pay, but on all of the other factors that make an employer attractive (challenging work, ability to have a significant impact, team based work approaches, flexibility in schedules, etc.) Lindow, Pratt and Jain (2007) validated that salaries level the playing field in their study of cooperative programs. Their report identified a list of areas of high importance to staff with 0–5 years of experience, providing that salary is within a perceived acceptable range:

- Variety and quality of project assignments
- Personal mentoring relationships
- Workplace atmosphere such as peer group and physical amenities
- Social contribution of the work being performance (local, world, environmental)
- Flexible work hours

Utilities must address the pay issue. Compensation must be competitive with the businesses that you compete with for employees in your community – not only with other utilities or government agencies. Implementing this strategy will require long-term strategic action by utilities.

Compensation matters. To acquire the best employees, it must be addressed.

**Examples of Use of Strategy:**

It is the policy of a **special operating district in the Pacific Northwest** to start a new hire at one-hundred and two percent of the market rate for the geographic area. Due to the presence of Nike World HQ and several high tech firms in the area, the District understands the need to pay competitively. They experience a zero turnover rate.

**A county in the Pacific Northwest** adjusted the steps for Civil Engineer 1 through 3 and Engineering Manager salaries to a higher step in order to be competitive in their area market. They are now exploring the possibility of stretching the top of the range for both positions to include a “Hot Skill Pay or Market Pay” to attract candidates to those positions.

**A wastewater utility on the West Coast** has taken several steps to change compensation structure:
- Twenty-two of forty-five classifications received equity adjustments in 2007 negotiations
- Medical benefits increase 10% each year
- Retiree medical benefits have increased, providing a tiered approach for years of service
  Specifically for Plant Operators:
- Shift differential increased to 12% for night shift operators
- Salary increases are possible within 6 months for trainees
A proposal has been submitted to add steps to the range for an overall salary increase.

**B. Apprenticeship Programs**

**PURPOSE:** DEVELOPMENT AND RETENTION/LONG-TERM
**TARGET JOB:** OPERATORS
**DESCRIPTION:**

This strategy focuses on developing an apprenticeship program for development of operators. The program can be specific to your organization or developed jointly with other utilities and/or educational institutions. Programs typically consist of classroom and on the job training and often home study. Learning is structured specific to the needs of the organizations involved (e.g., mechanical, electrical, instrumentation, operation, administration, etc.) Program participants may be identified from internal or external candidates.
Examples of Use of Strategy:

A water wholesaler on the West Coast implemented 2 five year apprenticeship programs for industrial maintenance electricians and industrial maintenance mechanics consisting of 8 semesters of college accredited courses in conjunction with 7,280 hours of structured OJT. There are currently 30 apprentices between the two programs; the utility employs a full time program staff; both programs are state registered and eligible for state funding.

A multi-utility organization has several apprenticeship programs including Electric Line Tech Water Pipefitter, Meter Specialist, Apparatus Apprentice. This utility also has specific training programs to support certain jobs: Operator Qualification (Gas), Meter Reader, Utility Locator, Equipment Operator, and Utility Service Specialist.

A southeast coastal electric and water utility implemented a four-year apprenticeship program for a combined maintenance mechanic-utilities installer servicer (pipefitter/equipment operator) job; this is an approved provider for coursework for state licensing requirements. There are currently twenty-seven apprentices in the program.

A wastewater utility on the West Coast created a Plant Operator III Training Program in 2003 with the purpose of training employees in twenty-four months. Of the ten initial trainees, four are now Operator III’s, one is a sub-journey operator, one is an entry operator, one was hired by a consulting firm, one hired by another utility, two did not pass the program.

C. Cultural Values

PURPOSE: DEVELOPMENT AND RETENTION/LONG-TERM
TARGET JOB: BOTH ENGINEERS AND OPERATORS
DESCRIPTION:
This was presented as a recruitment strategy, but has significant impact on retention as well. Gen X and Y employees will not be so quick to leave an organization that promotes development and diversity.

Examples of Use of Strategy:

The Central States Water Environment Association (CSWEA) has created an Outstanding YP of the Year Award to recognize the contributions of a young water environment professional for significant contribution to CSWEA and to the wastewater collection and treatment industry. The recipient will be advanced to WEF as the association’s nominee for the WEF award.

The organization Water for People provides opportunities for a utility to send representatives to work on projects developing water services in developing countries. Utilities that participate in this type of program reflect a cultural value that is appealing to Gen X and Y workers.
D. Advocate For and Implement Phased Retirement/Career Deceleration

**PURPOSE:** RETENTION/LONG-TERM  
**TARGET JOB:** BOTH ENGINEERS AND OPERATORS  
**DESCRIPTION:**  
Organizations can retain senior employees by “decelerating” their retirement schedule and utilizing these employees in a training and mentoring capacity. Essentially retirement becomes a phased process which is often a benefit to the utility and the employee. Organizations may need to work with the necessary agencies to restructure retirement rules to allow phased retirement and re-hiring retirees on a consulting basis. Use discernment in retaining retirees who represent new ways of thinking and support cultural changes that are in progress.

*Examples of Use of Strategy:*

A southeast coastal electric and water utility changed their retirement rules to allow workers to delay retirement, remaining employed in order to focus on training and knowledge retention activities with less-tenured employees.

E. Career Pathing

**PURPOSE:** DEVELOPMENT AND RETENTION/LONG-TERM  
**TARGET JOB:** BOTH ENGINEERS AND OPERATORS  
**DESCRIPTION:**  
Employees are more likely to remain at an organization that provides real opportunities for personal and professional development and advancement. Career paths for non-managerial (as well as managerial) positions provide avenues for development and self-learning (a value of Gen X and Y employees). Harvard, Vieaux and Keck found that promotion policies are perceived as fair if there are defined career paths. Career paths provide an employee with a sense of control over their future.

Utilities must develop paths for engineers and operators that provide real development. This could include rotation among a series of projects or content areas, and certification programs in specific skill areas. Programs focus on acquisition of a broad range of skills and knowledge, not just upward mobility.

*Examples of Use of Strategy:*

A southeast wastewater utility rewrote their job descriptions to define specific career paths along managerial and technical lines. Both paths offer similar compensation, benefits and rewards. The split career path offers opportunities for leadership and technical development depending on the interests and abilities of each individual.

A wastewater utility on the West Coast created non-managerial promotional paths for positions such as Technical Training Operator, Planner/Schedulers, and Principal Engineers.

A Pacific Northwest water/wastewater utility implemented a formal succession planning program. The mission of the program is to engage emerging leaders in identifying career paths that align their greatest strengths with the business needs of the utility.
F. Supervisor Development

PURPOSE: DEVELOPMENT AND RETENTION/LONG-TERM
TARGET JOB: BOTH ENGINEERS AND OPERATORS
DESCRIPTION:
Research shows that employees leave managers, not organizations (Towers-Perrin, “Engaging the Employee: What 17,000+ Public Sector Employees Say About the Work Experience,” IMPA Conference, Chattanooga, TN, May 2006). To successfully retain employees, utilities must focus on selecting and developing managers who are effective in managing their employees. The critical and major first step in implementing this strategy is to ensure employees in manager roles are gifted with the right set of talent and skill for that role. In interviews, the best managers often cannot say specifically what they do that results in success, but all cite a genuine care for people with an ‘employee first’ attitude as a common theme. It is old thinking that anyone can be a manager. Identify the resources best gifted to be effective managers, and then provide the knowledge and skills required for the role. Taking this action will result in an increase in the measure of employee engagement for your utility.

Examples of Use of Strategy:

A west coast water/wastewater utility implemented the Management Leadership Academy in January 2006 to address knowledge and skill development for key management positions District-wide. The program consists of 360° and personal assessments, individual development plans, group leadership training, coaching by senior managers and 6 month action learning assignments. The first group of 26 participants completed the program in December 2006. Four participants have been promoted to manager level positions and 2 to senior managerial positions. Two were hired in management positions at other agencies.

G. Workforce Development Program

PURPOSE: DEVELOPMENT AND RETENTION/LONG-TERM
TARGET JOB: BOTH ENGINEERS AND OPERATORS
DESCRIPTION:
This is a structured program that is used to identify internal candidates for future positions and begin grooming them to be successful in those positions. There are many variations on a workforce development program:
- Replacement planning identifies a specific candidate for a specific position
- Succession planning identifies a number of candidates who could potentially fill a position
- Workforce development promotes development of many candidates for many positions

Personal development programs, training, mentoring, and career pathing are all elements of a successful workforce development program. This is a critical strategy for organizations facing retirement of senior employees. Engaging younger employees in a workforce development program will provide a consistent and smooth transition as the workforce changes.
Examples of Use of Strategy:

A southeast coastal electric and water utility’s Workforce Readiness Strategy is comprised of seven initiatives to prepare for a sustainable workforce:

- Organization redesign to identify the optimal workforce size, structure, and source
- Knowledge transfer program that identifies vital people and work activities
- Training & career development that addressed Co-op and apprentice programs, career pathing, succession planning, and mentoring
- Policies and procedures
- Compensation practices and policies
- Flexible hiring
- External marketing of utility careers in partnership with the Florida Energy Workforce Consortium

A west coast water/wastewater utility implemented the Management Leadership Academy in January 2006 to address knowledge and skill development for key management positions District-wide. The program consists of 360° and personal assessments, individual development plans, group leadership training, coaching by senior managers and 6 month action learning assignments. The first group of 26 participants completed the program in December 2006. Four participants have been promoted to manager level positions and 2 to senior managerial positions. Two were hired in management positions at other agencies.

A privately operated, west coast utility with multiple locations launched the Service Leadership Academy in 2000 to identify and prepare front-line employees as future leaders for roles throughout the organization. The program includes on-line learning via Intra or Internet, guest lectures, case studies and oral presentations, hands-on application, and career assessments. To date, more that 75 employees from all disciplines and positions have graduated from the intensive one-year program. More than 50% of graduates have been promoted to management positions or to a higher level position in their job categories.

A Pacific Northwest gas and electric utility launched a workforce development program in partnership with local community colleges, Job Corps, and local governments to prepare individuals for leadership roles in the industry and provide a reliable supply of skilled employees. Their PowerPathway program is aimed at utility workers, apprentice line workers, apprentice electrical technicians, apprentice instrument technicians, apprentice welders, and equipment/field mechanics. Three separate tracks aim at participants with limited or no prior work experience, those with some experience, and those with formal related training. State, federal and internal foundation grants cover most course tuition.

A multi-utility organization has a formal Talent Management Program designed to prepare future leaders. Program objectives include providing enterprise-wide experiences for participants, increasing candidates' political awareness, and leveraging their strengths to become a well-qualified succession candidate.

H. Career Advancement Training

PURPOSE: DEVELOPMENT AND RETENTION/LONG-TERM
TARGET JOB: BOTH ENGINEERS AND OPERATORS
DESCRIPTION:

This strategy could be a subset of many others described in this report however it is worth
mentioning separately. This strategy refers to a structured program offered by an organization to teach and coach employees who desire to advance in methods of success. This could include seminars on learning the appropriate material to include on an application for a promotion, or interviewing tips that present your qualifications in the best light.

*Examples of Use of Strategy:*

A *southeast coastal electric and water utility* provides this type of training as a result of employees expressing concern that more positions were being filled with external candidates than internal candidates who were applying for promotions. This ratio has changed with regard to promotional opportunities.

**EMPLOYEE LIFE-CYCLE STRATEGIES**

Several development/retention strategies fall under the umbrella of what may be termed “employee life-cycle management”. This is a proactive, holistic approach to managing employees. According to Wagner and Harter (2007) an effective manager understands the lifecycle of an employee, sensing when an employee requires change in their work situation. These managers build opportunities for training, promotions, and new work assignments into the tenure of the employee which results in lengthened retention.

Effectively implementing this strategy requires use of many of the retention strategies presented in this report – personal development plans, mentoring, challenging work assignments, etc. Many of these strategies are also key to building a workforce development program.

**A. Employee Life Cycle Management**

**PURPOSE:** DEVELOPMENT AND RETENTION/LONG-TERM

**TARGET JOB:** BOTH ENGINEERS AND OPERATORS

**DESCRIPTION:**

Successful integration into the organization begins when an organization makes an offer of employment. Utilities must implement a structured approach to bringing a new employee into the organization. Factors that result in a positive on-boarding experience include assigning a ‘shepherd’ to assist in answering “where do I go for this?” questions, a defined process for acquainting the employee with work assignments, regular check-ins by an HR liaison, as well as the traditional employee orientation programs. Effective integration impacts retention. Many on-boarding programs last up to one year.

A *personal development plan* is a tool that provides structured direction for an employee’s development. It is often part of a workforce development program or employee lifecycle management. The plan is jointly developed by the employee and manager specifying specific learning and work opportunities that will prepare the employee for advancement in a managerial or technical role. Progress in this plan is reviewed and updated at regular intervals (quarterly, bi-annually). The plan often reflects a career path already established by the organization.

Use of *mentoring* is another strategy that is often part of a workforce development program or employee lifecycle management. Effective mentoring results from a structured approach that matches mentors with mentees based on specific criteria and goals. It is often used
to build specific skills in future organization leaders or managers, and a specific assessment process is utilized for matching candidates and assessing progress.

Providing **challenging work assignments** is key to retaining the younger generation of employees who are looking for meaningful experiences and projects. Some organizations rotate employees through a series of assignments. This provides the opportunity to find the best fit for an individual’s talent, knowledge and skills, and expose the employee to a variety of learning experiences.

**Examples of Use of Strategy:**

**A county in the Pacific Northwest** has implemented the “Civil Engineer in Training Program” to give newly hired engineers job experience in different areas of civil engineering and expose managers to different engineers. This results in increased networking opportunities for employees and mentoring relationships by established employees.

Mentoring is a key component of **a Pacific Northwest water/wastewater utility** development programs. “Directions” is aimed at building leadership capacity within individuals and creating a culture that helps management and others lead the utility into the future. The program is a succession planning model for leadership positions. Mentoring by senior leadership was used as a career planning tool to reinforce personal accountability.

**A wastewater utility on the West Coast** is using a mentoring approach to knowledge capture.

**A multi-utility organization** has a formal mentoring program where interested protégés apply and are matched with willing mentors; and senior leaders may have organization supported coaches to assist in their leadership development.

**A county in the Pacific Northwest** has implemented rotation opportunities for engineers who have been in the same position for 3 to 5 years or by providing special assignments typically outside the normal work for an engineer. These provide the engineer with experience in different areas of civil engineering resulting in increased job satisfaction and more likely advancement. The County is also flexible in re-hiring engineers after they have transferred to another City department for advancement opportunities.

**B. Work/Life Balance**

**PURPOSE:** **DEVELOPMENT AND RETENTION/LONG-TERM**

**TARGET JOB:** **BOTH ENGINEERS AND OPERATORS**

**DESCRIPTION:**

Research has documented that younger generations who have seen their parents give excessive hours to a job are seeking positions that support balance between the professional and personal aspects of their lives (IMPA-HR News September 07). The era of 50+ hour work weeks is gone. Savvy job-seekers will investigate the work/life balance experienced by current employees so the key to effectively implementing this strategy is modeling the way. Create an environment that respects and promotes this balance.
Examples of Use of Strategy:

The nation’s largest provider of eye care wellness benefits understands the need for work/life balance by:

- Recognizing and inspiring employees with fun activities!
- Supporting employees need for balance through flexible scheduling, telecommuting, paid volunteer time, market-leading benefit packages
- Giving back to their community

Several utilities have implemented programs focused on the quality of work life.

A special operating district in the Pacific Northwest utilizes a flexible work schedule that provides every other Friday off. This District also provides employees with the opportunity to participate in community service programs for a limited number of work hours.

C. Employee Engagement

PURPOSE: DEVELOPMENT AND RETENTION/LONG-TERM
TARGET JOB: BOTH ENGINEERS AND OPERATORS
DESCRIPTION:

Not enough can be written about the importance of employee engagement as a strategy for retaining employees. Employee engagement impacts all key business performance indicators such as customer service and profitability. It is much more that employee satisfaction; it represents true commitment by the employee to the values and goals of the organization.

As defined by Wagner and Harter in 12: The Elements of Great Managing (2007), an engaged employee is one who has the opportunity daily to use their talents, skills and knowledge in service to the organization. Wagner and Harter provide a tool (the Q12) that measures engagement using 12 questions that assess factors such as “I know what is expected of me at work” to “This last year I have had opportunities to learn and grow.” This is a quick measure that informs employers when action is required to increase likelihood of retention. Other tools, such as surveys that measure employee engagement are available from Towers-Perrin and from Mercer: (http://www.towersperrin.com/tp/lobby.jsp?country=global).

Measures of engagement are highly dependent on the manager-employee relationship (employees leave managers, not organizations).

Measuring employee engagement is a key indicator of success of the actions your organization is taking to build workforce sustainability.

Examples of Use of Strategy:

A southeast wastewater utility has been conducting engagement surveys to help them understand the link between leadership talents and employee engagement. They are using that understanding to shift duties among managers to better fit their individual abilities.

A southern water/wastewater utility is conducting engagement surveys on a regular frequency to establish baseline data for future evaluation. Their plan is to use this information to improve worker productivity and morale by creating a better work environment.
CHAPTER 6
CONCLUSION

KEY FINDINGS

Utility survey results show that the majority of utilities who responded are not addressing their workforce issues from a strategic and programmatic approach.

There are new pools of workers available as well as the traditional pools typically recruited by utilities. Tapping into those pools will require creative approaches on the part of utilities in order to gain a competitive edge in recruitment and retention.

A single recruiting strategy will not be effective. Utilities must utilize multiple channels to tap into pools that are accessible to their organization (in terms of geographic location, number of positions to be filled, size of the pool available, etc.)

Utilities must build on their proven capabilities of working together to solve labor issues via activities such as joint apprenticeship programs, developing cross training programs, and changing the public image of the utility industry. This is particularly applicable for organizations that have a multi-channeled workforce development or recruitment program in place and continue to experience a labor gap.

The utility industry must adopt successful practices from those used in out-of-industry in order to meet the coming labor crisis. This will require policy and potentially legislative changes to hiring and retirement practices.

Operational and Human Resource managers must become savvy making the case for tactics that may not have been sanctioned in the past such as double filling positions, delaying retirements, and hiring older workers. One resource for building a business case for a workforce development program is the recently released AwwaRF report 3120, “Strategies to help Drinking Water Utilities Ensure Effective Retention of Knowledge”.

HOW TO GET STARTED

A common theme heard as the research team completed this project is that utilities are unsure how to begin addressing issues of recruitment, development, and retention in their organizations.
The 4-step model for developing a workforce planning program was presented in Chapter 5 and is shown again in Figure 6-1. Again the four steps are:

**Step One:** SCAN the current environment to determine workforce needs and drivers based on your utility business strategy.

**Step Two:** ASSESS your current workforce practices against most effective workforce practices to identify what you need to be doing for future operational sustainability.

**Step Three:** PLAN a program specific to your unique situation to implement effective workforce practices, prioritize actions, and identify performance measures.

**Step Four:** IMPLEMENT the program, measure strategic outcomes, and adjust actions as business strategies change.

To begin the SCAN step of this process, every organization should complete their “gap analysis” to gain a clear picture of their unique labor situation. The gap analysis is a reflection of the anticipated inflows and outflows to the organization’s labor pool that will be experienced in the next 5 years. Changes may be due to retirements, terminations, demotions, promotions, disabilities, new hires, transfers, redesigned work practices, new facilities, and new regulations. Understanding these inflows and outflows will provide a starting point for designing a workforce development program specific to your organization.
To assist utilities in getting started with the **ASSESS** step of this process, this report includes a brief interactive workforce practices assessment on the accompanying CD. The assessment leads the respondent through a series of practice statements related to your current situation. Upon completion of the assessment, respondents will be directed to specific strategies for recruitment, development, and retention outlined in Chapter 5 that may address the utility’s specific situation.

This “mini-assessment” is a shortened version of a longer workforce practices assessment that is typically delivered in a facilitated process with a team of utility managers. This shortened version provides only a limited assessment of the effectiveness of the organization’s workforce practices; for a more complete evaluation against industry effective practices, the facilitated assessment is recommended. Completing the facilitated assessment as a team of operations and human resource managers is an effective first step toward building alignment around the need for a workforce development plan at your organization.

The **PLAN** and **IMPLEMENT** steps of this four step process require a change management approach. Actions at this point include prioritizing needs, building program components to meet specific needs, and identifying the measures of success for your program. This requires steps to build commitment and alignment of the strategic and tactical teams designated to design and implement the programs.

Understanding your organization’s current status in this 4 step process is the key to knowing which strategies described in this report section will most effectively move your organization toward workforce sustainability.

**WEBSITES PROVIDE IDEAS FOR ACTION STEPS**

Out-of-industry websites provide examples of strategies to successfully meet workforce challenges. Websites that may be of interest are:

- Constructmyfuture.org
- Cewd.org
- Getintoenergy.com
- Epceonline.org
- 21stcenturyskills.org
- Engineeryourlife.org

**OPPORTUNITIES FOR FUTURE RESEARCH**

Many topics surface that would build industry knowledge in the areas of recruitment, employee development, retention, and overall workforce planning issues.

One approach to research that has been fostered by utility organizations is to examine opportunities for collaboration among utilities on a regional, state, and perhaps even national basis. Potential areas of collaboration are:

- Identify a framework for constructing a multi-utility apprenticeship or co-op program.
- Develop a common approach and curricula that utilities can use for leadership development. The industry currently uses the two-week intensive program for utility leaders provided by the University of North Carolina at Chapel Hill.
- Develop a framework for a water sector website that is similar to the getintoenergy.com website focused on the energy sector. This site provides
educational information about careers in the energy sector, quizzes that allow a student to determine if this sector is right for their skills, information for parents and educators, and actual video interviews with employees enrolled in electric utility apprenticeship and skill certification programs.

- Develop an industry-wide program for public awareness and image building that enhances the image of the industry in the eyes of the Gen Y population. Provide ready made materials similar to those provided by “Water is Life and Infrastructure Makes It Happen” or “Tap Water Delivers” that focus on career options in an exciting and innovative industry. Encourage participation of students and young professionals in this and the preceding research suggestions.

- Develop a pilot project of utility groups in the southeast, California or Florida to develop an outreach program to armed forces. Validate the availability of candidate pools in this area.

More traditional research could be to conduct a series of case studies documenting a handful of organizations that have experienced the complete process of workforce planning – from implementing recruiting strategies through building retention programs. Examine the before, during and after states of each organization identifying critical success factors of the utility’s program.
APPENDIX A
UTILITY SURVEY INSTRUMENT AND RESULTS

SURVEY INSTRUMENT

Following is the survey that was completed by twenty-six utility participants. The results of the survey begin on page 78.

Welcome to the AwwaRF survey for Workforce Planning! The primary objective of this research project is to frame the issues of recruiting, training and retaining drinking water utility operators and engineers. It will identify short-term and long-term strategies that can be implemented by individual utilities and by the industry to address the issues.

As a part of this research, we are conducting a survey of water and wastewater utilities. The results of the survey will be available to each utility that participates in the survey. It will show the results of all of the utilities completing the survey and the results will be anonymous.

It is important that you make a copy of your completed survey so you can compare your responses to those of the other utilities.

Section 1. Utility Background

1. What is your corporate structure?

   ○ Public: Part of local governance - City, County, non-enterprise fund
   ○ Public: Part of local governance - City, County, enterprise fund
   ○ Public: Independent governance
   ○ Investor-Owned (private or public traded stock)
   ○ Other (please specify: ____________________________

©2008 AwwaRF. ALL RIGHTS RESERVED
2. What is your utility's form of governance?
   - Board of Directors or Commissions
   - City or County Government
   - Other (please specify):

3. Please indicate which operation description best describes your organization.
   - Water Only
   - Wastewater Only
   - Joint Water/Wastewater

4. Please check all of the services provided by your utility:
   - Potable Water Treatment
   - Stormwater Treatment
   - Wastewater Treatment (wholesale)
   - Raw Water Transmission (wholesale)
   - Reclaimed/Reuse Water Collection
   - Reclaimed/Reuse Water Treatment
   - Electric Generation
   - Electric Distribution
   - Natural Gas Distribution

5. Number of total accounts:
   - Residential: __________________
   - Commercial: __________________
   - Industrial: __________________
   - Total Population Served by all types of accounts: __________________

6. What is your system capacity (the maximum amount of water and/or wastewater your system can treat, store or collect in a day)?
   __________________

7. Does your organization have a residency requirement to live within City limits?
   - Yes
   - No

8. Is your organization required to comply with Civil Service?
   - Yes
   - No

9. The Human Resource group that supports our hiring process is:
   - Within our utility
   - Within the city, county structure and separate from our organization
   - We have both a utility human resource group and a city/county human resource group
   - Other (please specify):

10. Who "owns" the policy or procedure for hiring (i.e. who determines the policy)?
    - City
    - Utility
    - Independent Review Board
    - Governing Board

11. Who makes the hiring decisions for prospective Engineers?
    - Supervising Manager
    - Multiple Managers
    - Team Approach (peers and other managers)
    - Outside Utility Participants (Review Board)
    - Human Resource Department
    - Other (please specify):

12. Who makes the hiring decisions for prospective Operators?
    - Supervising Manager
    - Multiple Managers
    - Team Approach (peers and other managers)
    - Outside Utility Participants (Review Board)
    - Human Resource Department
    - Other (please specify):
## Section II. Needs/Drivers/Barriers

1. Please complete the table below for each position listed:

<table>
<thead>
<tr>
<th>Position</th>
<th>Established (Budgeted) Number of Full-Time Equivalents</th>
<th>Current Number of Full-Time Equivalents</th>
<th>Number of Vacancies Currently Trying to Fill</th>
<th>Average Time to Fill the Position</th>
<th>Annual Percentage Turnover Rate (Most Recent 12 Months)</th>
<th>Difficult to Recruit **</th>
<th>Difficult to Retain **</th>
<th>Average Cost to Fill a Position (in % of Salary)</th>
<th>Average Number of Months to Fill Position</th>
<th>Average Tenure (Years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Utility Staff</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineers (Entry Level)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineers (Career)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineering Technician</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operators (Treatment)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operators (Consult/Project)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operators (Field)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* From the official opening/posting to acceptance of the position
** Relative to difficulty of recruiting and retaining other positions

2. Please choose the confidence level of the data you entered in the above table:
- Low Confidence (no real data, just estimates)
- Some Confidence (some supporting data exists)
- Moderate Confidence (data exists to support many of the entries)
- Good Confidence (data exists to support the majority of the entries)
- High Confidence (all entries are supported by actual data)

3. Exit interview data shows that Engineers leave their positions due to: (check 3 most typical responses)
- **We don’t do exit interviews**
  - Pay
  - Benefits
  - More Desirable Duties
    - Within the Utility
    - Within the City
    - Another Utility - Nearby Location
  - Consulting Firm
  - Private Industry
  - Promotion Opportunity
    - Within the Utility
    - Within the City
    - Another Utility - Nearby Location
  - Other (please specify):

4. Exit interview data shows that Operators leave their positions due to: (check 3 most typical responses)
- **We don’t do exit interviews**
  - Pay
  - Benefits
  - More Desirable Duties
    - Within the Utility
    - Within the City
    - Another Utility - Nearby Location
  - Consulting Firm
  - Private Industry
  - Promotion Opportunity
    - Within the Utility
    - Within the City
    - Another Utility - Nearby Location
  - Other (please specify):

5. What is your organization doing to prepare for the aging workforce?
- Identifying Mission Critical Positions
- Projecting Future Needs for Knowledge, Skills, and Abilities
- Monitoring Turnover
- Monitoring Service Levels
- Tracking Retirement Eligibility
- Identifying Planned Retirements
- Other (please specify):
### Section III. Current Recruiting Approach

1. Some of the typical methods for recruiting are listed below. Check the top three methods you use for recruiting Engineers:

<table>
<thead>
<tr>
<th>Method</th>
<th>Engineering</th>
<th>Operators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal Posting</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Local Newspaper</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Industry Publications</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Referral Program</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Word-of-Mouth</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Professional Search Firms</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Online Job search (i.e., Monster.com)</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Industry Associations</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Other (please specify)</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

2. Some of the typical methods for recruiting are listed below. Check the top three methods you use for recruiting Operators:

<table>
<thead>
<tr>
<th>Method</th>
<th>Engineering</th>
<th>Operators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal Posting</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Local Newspaper</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Industry Publications</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Referral Program</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Word-of-Mouth</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Professional Search Firms</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Online Job search (i.e., Monster.com)</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Industry Associations</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Other (please specify)</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

3. Listed below are typical places for recruiting. For Engineers (check top three):

<table>
<thead>
<tr>
<th>Place</th>
<th>Engineering</th>
<th>Operators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colleges and Universities</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Trade Schools</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Other (please specify)</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

4. Listed below are typical places for recruiting. For Operators (check top three):

<table>
<thead>
<tr>
<th>Place</th>
<th>Engineering</th>
<th>Operators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colleges and Universities</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Trade Schools</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Other (please specify)</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

5. List successful approaches for recruiting used by your utility, including any innovative or unique approaches:

### Section IV. Attractors

1. Rate the top three reasons that you believe Engineers come to work for your organization:

<table>
<thead>
<tr>
<th>Reason</th>
<th>MF</th>
<th>NF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attractive Salary (Base, Overtime, Vacation)</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Comprehensive Medical Benefits (Medical/Dental Plan, 125 Plan, drug coverage, etc.)</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Comprehensive Retirement Package (pension plan, retirement savings plan, etc.)</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Performance Compensation Program (incentive pay, bonus, shared savings program, etc.)</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Educational Reimbursement Program</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Professional Development Opportunities</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Wellness Program (fitness club, counseling, disability coverage, etc.)</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Low Cost of Living</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Other Benefits (please describe)</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

2. Rate the top three reasons that you believe Operators come to work for your organization:

<table>
<thead>
<tr>
<th>Reason</th>
<th>MF</th>
<th>NF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attractive Salary (Base, Overtime, Vacation)</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Comprehensive Medical Benefits (Medical/Dental Plan, 125 Plan, drug coverage, etc.)</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Comprehensive Retirement Package (pension plan, retirement savings plan, etc.)</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Performance Compensation Program (incentive pay, bonus, shared savings program, etc.)</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Educational Reimbursement Program</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Professional Development Opportunities</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Wellness Program (fitness club, counseling, disability coverage, etc.)</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Low Cost of Living</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Other Benefits (please describe)</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>
3. We provide (or reimburse for) the following types of training for Engineers:
   - Required training to maintain Professional Engineer (PE) certification
   - Optional skill training program
   - Optional leadership or management training program
   - Other Optional training (please specify):

4. The percentage of Engineers who take advantage of Optional training is:
   - [ ] 0-20%
   - [ ] 21-40%
   - [ ] 41-60%
   - [ ] 61-80%
   - [ ] 81-100%

5. We provide (or reimburse for) the following types of training for Operators:
   - Required training to maintain Operator Certification/License
   - Optional skill training program
   - Optional leadership or management training program
   - Other Optional training (please specify):

6. The percentage of Operators who take advantage of Optional training is:
   - [ ] 0-20%
   - [ ] 21-40%
   - [ ] 41-60%
   - [ ] 61-80%
   - [ ] 81-100%

7. Salary market analysis studies have shown our starting salaries (salary only, not benefits) for Engineers are:
   - Engineer (Entry-Level)
     - At Market
     - Below Market
     - Above Market
   - Engineer (Senior)
     - At Market
     - Below Market
     - Above Market
   - Engineering Technician
     - At Market
     - Below Market
     - Above Market

8. Salary market analysis studies have shown our starting salaries (salary only, not benefits) for Operators are:
   - Operator (Treatment)
     - At Market
     - Below Market
     - Above Market
   - Operator (Control Center)
     - At Market
     - Below Market
     - Above Market
   - Operator (Field)
     - At Market
     - Below Market
     - Above Market

9. Please choose the Confidence Level of the data you entered in the above two statements on salary market analysis:
   - [ ] Low Confidence (no real data, just an estimate)
   - [ ] Some Confidence (some supporting data exists)
   - [ ] Moderate Confidence (data exists to support many of the entries)
   - [ ] Good Confidence (data exists to support the majority of the entries)
   - [ ] High Confidence (all entries are supported by actual data)

10. Describe your overall compensation philosophy or strategy:
### Section V. Workforce Planning Practices

1. We routinely use the following practices to meet our need for Engineering Services:
   - Regular Full-Time Employees
   - Regular Part-Time Employees
   - Contract Employees (Full-Time or Part-Time)
   - Temporary Employment Services
   - Internship and Cooperative Education (Programs with Colleges and Universities)
   - Contract with individuals who are Retired from our Organization
   - Contract with Consulting Firms
   - Utilize City or Public Works Engineering Services
   - Other (please specify):

2. We routinely use the following practices to meet our need for Operator Services:
   - Regular Full-Time Employees
   - Regular Part-Time Employees
   - Contract Employees (Full-Time or Part-Time)
   - Temporary Employment Services
   - Internship and Cooperative Education (Programs with Colleges and Universities)
   - Contract with individuals who are Retired from our Organization
   - Contract with Private Operating Service
   - Contract with Consulting Firms
   - Other (please specify):

3. We are using the following practices to meet staffing needs in other areas (non-engineer, non-operator) of our organization:
   - Regular Full-Time Employees
   - Regular Part-Time Employees
   - Contract Employees (Full-Time or Part-Time)
   - Temporary Employment Services
   - Internship and Cooperative Education (Programs with Colleges and Universities)
   - Contract with individuals who are Retired from our Organization
   - Contract with Consulting Firms
   - Other (please specify):

4. We have conducted a formal, quantitative “gap analysis” to identify our future staffing needs.
   - Never do this
   - 1. Done on an as-needed basis
   - 3. Sometimes do this; an aspect of numerous activities
   - 4. Typically do this
   - 5. Often do this; omitted only in exceptional circumstances
   - 6. Always do this; standard operating procedure

5. We utilize formal Succession Planning to build a pool of candidates qualified for key leadership management positions that will be vacated in the next five years.
   - Never do this
   - 1. Done on an as-needed basis
   - 3. Sometimes do this; an aspect of numerous activities
   - 4. Typically do this
   - 5. Often do this; omitted only in exceptional circumstances
   - 6. Always do this; standard operating procedure

6. The percent of key leadership management vacancies that are filled by candidates from the Succession Planning pool is:
   - 0-20%
   - 21-40%
   - 41-60%
   - 61-80%
   - 81-100%

7. We utilize Replacement Planning to identify a specific individual to replace key leadership management positions that will be vacated in the next five years.
   - Never do this
   - 1. Done on an as-needed basis
   - 3. Sometimes do this; an aspect of numerous activities
   - 4. Typically do this
   - 5. Often do this; omitted only in exceptional circumstances
   - 6. Always do this; standard operating procedure

8. The percent of key leadership management vacancies that are filled by the identified Replacement candidate is:
   - 0-20%
   - 21-40%
   - 41-60%
   - 61-80%
   - 81-100%

9. We provide formal skill training programs to prepare employees for advancement.
   - Never do this
   - 1. Done on an as-needed basis
   - 3. Sometimes do this; an aspect of numerous activities
   - 4. Typically do this
   - 5. Often do this; omitted only in exceptional circumstances
   - 6. Always do this; standard operating procedure

©2008 AwwaRF. ALL RIGHTS RESERVED
10. The percent of our workforce who participate in skill training programs annually is:
   ○ 0-20% ○ 21-40% ○ 41-60% ○ 61-80% ○ 81-100%

11. We provide formalized development opportunities such as executive coaching, leadership development programs, or mentoring programs to prepare employees for future leadership positions.
   ○ 1 Never do this ○ 4 Typically do this
   ○ 2 Done on an as-needed basis ○ 5 Often do this, omitted only in exceptional circumstances
   ○ 3 Sometimes do this, an aspect of numerous activities ○ 6 Always do this, standard operating procedure

12. The percent of our workforce who participate in formalized development executive coaching, leadership development or mentoring programs annually is:
   ○ 0-20% ○ 21-40% ○ 41-60% ○ 61-80% ○ 81-100%

13. We have a Knowledge Management Program in place to capture critical knowledge from employees eligible for retirement in the next five years.
   ○ 1 No formal approach ○ 4 Typically format; used in most situations
   ○ 2 Format as needed, based on criticality ○ 5 Formally established; omitted only in exceptional circumstances
   ○ 3 Sometimes formal procedures; used in some situations ○ 6 Formally enforced, standard operating procedure

14. We have a Knowledge Management Program in place to capture critical organization policies, procedures and work processes.
   ○ 1 No formal approach ○ 4 Typically format; used in most situations
   ○ 2 Format as needed, based on criticality ○ 5 Formally established; omitted only in exceptional circumstances
   ○ 3 Sometimes formal procedures; used in some situations ○ 6 Formally enforced, standard operating procedure

15. We routinely review our work processes to increase efficiency and reduce our need for labor resources.
   ○ 1 Never do this ○ 4 Typically do this
   ○ 2 Done on an as-needed basis ○ 5 Often do this; omitted only in exceptional circumstances
   ○ 3 Sometimes do this, an aspect of numerous activities ○ 6 Always do this, standard operating procedure

16. Our workforce planning strategy is tightly linked to our organization’s overall strategic direction.
   ○ 1 Not emphasized ○ 4 Generally emphasized, something we do and check
   ○ 2 Moderate emphasis, some efforts underway ○ 5 Strongly emphasized, something we measure
   ○ 3 Moderately emphasized, something we try to adhere to ○ 6 Heavily emphasized, one of our business principles

17. Completing a Workforce Plan or Succession Plan was identified as a key objective in our current Strategic Plan.
   ○ 1 Not emphasized ○ 4 Generally emphasized, something we do and check
   ○ 2 Moderate emphasis, some efforts underway ○ 5 Strongly emphasized, something we measure
   ○ 3 Moderately emphasized, something we try to adhere to ○ 6 Heavily emphasized, one of our business principles

Thank you for completing this survey to help the water and wastewater industry address the issues surrounding workforce issues!
SURVEY RESULTS

Following are the results of the survey that was completed by utility participants.

![Bar chart showing corporate structures](chart1)

**What is Your Corporate Structure?**

- Public: Part of local governance - City, County, non-enterprise fund
- Public: Part of local governance - City, County, enterprise fund
- Public: Independent governance
- Investor-Owned (private or public traded stock)
- Other

**Number of Utility Responses**

![Bar chart showing forms of governance](chart2)

**What is your utility's form of governance?**

- Board of Directors or Commissions
- City or County Government
- Board of Water Commissioners/Detroit City Council

**Number of Utility Responses**
Please indicate which operation description best describes your organization.

- Water Only
- Wastewater Only
- Joint Water/Wastewater

Number of Utility Responses

Please check all of the services provided by your utility:

- Potable Water Treatment
- Potable Water Distribution
- Raw Water Transmission (wholesale)
- Wastewater Collection
- Wastewater Treatment
- Stormwater Collection
- Stormwater Treatment
- Reclaimed Water Treatment
- Reclaimed/Irrigation Water Distribution
- Electric Generation
- Electric Distribution
- Natural Gas Distribution
- Solid Waste Collection
- Solid Waste Transfer/Disposal
- Other (please describe):
- Environmental Compliance
- Water Quality Management

Number of Utility Responses
### NUMBER OF TOTAL ACCOUNTS:

<table>
<thead>
<tr>
<th>Residential:</th>
<th>Commercial:</th>
<th>Industrial:</th>
<th>Total Population Served by all types of accounts:</th>
</tr>
</thead>
<tbody>
<tr>
<td>10,000</td>
<td>11,257</td>
<td>60</td>
<td>40,000</td>
</tr>
<tr>
<td>85,000</td>
<td>2,500</td>
<td>Included in Commercial</td>
<td>330,000</td>
</tr>
<tr>
<td>17,000</td>
<td>2,805</td>
<td>1,410</td>
<td>650,000</td>
</tr>
<tr>
<td>75,000</td>
<td>10,180</td>
<td>1,062</td>
<td>600,000 residential; 600,000 commercial / industrial</td>
</tr>
<tr>
<td>80,000</td>
<td>4,100</td>
<td></td>
<td>417,000</td>
</tr>
<tr>
<td>45,400</td>
<td>approx.</td>
<td>1,000</td>
<td>3.3 million</td>
</tr>
<tr>
<td>37 communities/local authorities</td>
<td></td>
<td></td>
<td>567,000</td>
</tr>
</tbody>
</table>

Water: 236,652
WW-191.812

Water: 166,400
WW-12,630

Water: 765,550
WW-842,350

### What is your system capacity (the maximum amount of water and/or wastewater your system can treat, store or collect in a day)?

- **124 MGD**
- **110 MGD full secondary wastewater treatment**
- **W.A. - distribution and collection only**
- **14 MGD**
- **Water: 2.12 million litres/day**
- **Wastewater: 1.540 litres/day**
- **80 mgd**
- **Water: 288MGD, WW: 145MGD**
- **Water: 1,400 MGD treated; 300 MGD stored. Sewage 1,700 MGD treatment (peak including wet weather)**
- **200 million**
- **Water - 90MGD/day; Wastewater - not determined by effluent discharge, although hydraulic design is 42**
- **900 million gallon capacity pipeline**
- **225 MGD**
- **76,000,000**
- **55 MGD water; 34 MGD sewer**
- **54 million gallons per day**
- **120 Million Gallons Per Day**
- **118 mgd water 36.5 mgd wastewater**
- **31.1 million gallons**
- **124 MGD water, 73 MGD wastewater**
Does your organization have a residency requirement to live within City limits?

Yes

No

Number of Utility Responses

Is your organization required to comply with Civil Service?

Yes

No

Number of Utility Responses
The Human Resource group that supports our hiring process is:

- Within our utility
- Within the city, county structure and separate from our organization
- We have both a utility human resource group and a city/county human resource group

Who "owns" the policy or procedure for hiring (i.e., who determines the policy)?

- City
- Utility
- Independent Review Board
- Governing Board
Who makes the hiring decisions for prospective Engineers?

- Supervising Manager
- Multiple Managers
- Team-Approach
- Outside Utility Participants
- Human Resource Department
- Both HR and multiple Managers on panel
- Hiring Authority such as Manager or Director
- Executive Director and Chief Engineer approval;
- Hiring Manager recommendation
- Department Director with Supervisor/Manager
- City Human Resources and the Detroit Water and Sewerage Department

Who makes the hiring decisions for prospective Operators?

- Supervising Manager
- Multiple Managers
- Team-Approach
- Outside Utility Participants
- Human Resource Department
- Both HR and multiple Managers on panel
- Hiring Authority such as Manager or Director
- Executive Director and Chief Engineer approval;
- Hiring Manager recommendation
- Department Director with Supervisor/Manager
- City Human Resources and the Detroit Water and Sewerage Department
Exit interview data shows that Engineers leave their positions due to:

1. We don't do exit interviews
2. Pay
3. Benefits
4. Cost of Living
5. More Desirable Community
6. Career Change
7. Return to School
8. Retired
9. Don't Know

Number of Utility Responses

Exit interview data shows that Engineers leave their positions due to:

1. More Desirable Duties
   - Within the Utility
   - Within the City
   - Another Utility - Nearby Location
   - Another Utility - Outside the Area
   - Consulting Firm
   - Private Industry
2. Promotion Opportunity
   - Within the Utility
   - Within the City
   - Another Utility - Nearby Location
   - Another Utility - Outside the Area
   - Consulting Firm
   - Private Industry

Number of Utility Responses
Exit interview data shows that Operators leave their positions due to:

- We don't do exit interviews
- Pay
- Benefits
- Cost of Living
- More Desirable Community
- Career Change
- Return to School
- Retired
- Don't Know

Number of Utility Responses

Exit interview data shows that Operators leave their positions due to:

- More Desirable Duties
- Within the Utility
- Within the City
- Another Utility - Nearby Location
- Another Utility - Outside the Area
- Consulting Firm
- Private Industry
- Promotion Opportunity
- Within the Utility
- Within the City
- Another Utility - Nearby Location
- Another Utility - Outside the Area
- Consulting Firm
- Private Industry

Number of Utility Responses

©2008 AwwaRF. ALL RIGHTS RESERVED
What is your organization doing to prepare for the aging workforce?

- Identifying Mission Critical Positions
- Monitoring Turnover
- Tracking Retirement Eligibility
- Identifying Planned Retirements
- Protecting Future Needs for Knowledge, Skills, and Abilities
- Monitoring Service Levels

**Number of Utility Responses**

---

**OTHER:**

- Planned implementation of Enterprise search engine to recover subject-related data
- Partner with local Com. College, Interns & trainee positions
- Participation in this AwwaRF Project
- Added strategic initiative for Knowledge Management
- Capturing knowledge through development of SOPs
- Increased staffing at entry levels in order to increase opportunities for "on-the-job training" within the line of progression to Senior Operator
- Offering new apprenticeship programs
- Knowledge Transfer, Employee Development (current workforce)
- Development of succession plans, where applicable
- Succession planning and supervisory training
- Beginning succession planning and comprehensive HR
- Succession Planning
- Succession planning
Methods used by utilities for recruiting Engineers:

- Internal Posting
- Local Newspaper
- Industry Publication
- Referral Program
- Word-of-Mouth
- Professional Search Firms
- On-line job search (i.e., Monster.com)
- Industry Associations

Number of Utility Responses

Methods used by utilities for recruiting Operators:

- Internal Posting
- Local Newspaper
- Industry Publication
- Referral Program
- Word-of-Mouth
- Professional Search Firms
- On-line job search (i.e., Monster.com)
- Industry Associations

Number of Utility Responses
Listed below are typical places for recruiting. For Engineers (check top three):

- Colleges and Universities
- Trade Schools
- Job Fairs
- Conferences
- High Schools
- Internship Program

Number of Utility Responses

Listed below are typical places for recruiting. For Operators (check top three):

- Colleges and Universities
- Trade Schools
- Job Fairs
- Conferences
- High Schools
- Internship Program

Number of Utility Responses

©2008 AwwaRF. ALL RIGHTS RESERVED
List successful approaches for recruiting used by your utility, including any innovative or unique approaches:

Successful approaches include using rich industry association websites such as, bcwwaterjobs, AWWA. We recently developed a youth apprenticeship program called (FUTURES) for trade and craft positions with local high schools.

Internal Posting, Company Website.

Early stages of a partnership with Gateway Community College to create public outreach for water industry workers. Local cities, and other water industries are involved in this effort. Creating recruitment brochure to use at job fairs. Hiring at the trainee level and training for Operators - this is proving to be successful.

Very traditional - Civil Service - Our Internship Program for Engineers is probably our best, however, we have instituted a summer worker program for high school students who are interested in the field of utilities.

Over the past several years our strategy for filling future vacancies in the water and wastewater treatment operations area has been by word of mouth. Those positions have been entry level operator trainee positions. The initial hire has been through a temporary staffing agency. The potential candidate would have to pass a reading comprehension and mathematical aptitude test as well as a mechanical aptitude test. Upon achieving passing scores on both tests the candidate would be hired through the temporary staffing agency and evaluated over a period of time. This entry level trainee position has eight steps lasting six months each. There are milestones that must be completed during each six month period. If a candidate is unsuccessful at any of the eight phases he/she may be released. The hope is that the employee successfully completes each six month phase and at the end of one year is eligible to sit for the State of Florida Water or Wastewater treatment operator exam. With the State of Florida operator license the candidate would qualify for the next water or wastewater operator opening which would give them long term civil service status.

We primarily use internet advertising for recruiting along with our own employment web site and job hotline.

Job Fairs have been a successful recruiting option for operations personnel.

Rate the top three reasons that you believe Engineers come to work for your organization: FINANCIAL ATTRACTORS

- Attractive Salary (Base, Overtime, Vacation)
- Comprehensive Medical Benefits (Medical/Dental Plan, 125 Plan, drug coverage, etc.)
- Comprehensive Retirement Package (pension plan, retirement savings plan, etc.)
- Performance Compensation Program (incentive pay, bonus, shared savings program, etc.)
- Educational Reimbursement Program
- Professional Development Opportunities
- Wellness Program (fitness club, counseling, disability coverage, etc.)
- Low Cost of Living

Number of Utility Responses

©2008 AwwaRF. ALL RIGHTS RESERVED
Rate the top three reasons that you believe Engineers come to work for your organization: NON-FINANCIAL ATTRACTORS

- Job Security
- Favorable Work Conditions
- Interesting Work or Variety of Work
- Diversity of Current Workforce (age, gender, ethnicity)
- Work that is Worthwhile to Society
- Flexible Work Schedule
- Time-off to Volunteer (for non-profit organization)
- Desirable Community
- Flexible Job Position (cross-skilling, job rotation, job-sharing, etc.)

Rate the top three reasons that you believe Operators come to work for your organization: FINANCIAL ATTRACTORS

- Attractive Salary (Base, Overtime, Vacation)
- Comprehensive Medical Benefits (Medical/Dental Plan, 125 Plan, drug coverage, etc.)
- Comprehensive Retirement Package (pension plan, retirement savings plan, etc.)
- Performance Compensation Program (incentive pay, bonus, shared savings program, etc.)
- Educational Reimbursement Program
- Professional Development Opportunities
- Wellness Program (fitness club, counseling, disability coverage, etc.)
- Low Cost of Living

©2008 AwwaRF. ALL RIGHTS RESERVED
Rate the top three reasons that you believe Operators come to work for your organization: NON-FINANCIAL ATTRACTORS

- Job Security
- Favorable Work Conditions
- Interesting Work or Variety of Work
- Diversity of Current Workforce (age, gender, ethnicity)
- Work that is Worthwhile to Society
- Flexible Work Schedule
- Time-off to Volunteer (for non-profit organization)
- Desirable Community
- Flexible Job Position (cross-skilling, job rotation, job-sharing, etc.)

We provide (or reimburse for) the following types of training for Engineers:

- Required training to maintain Professional Engineer (PE) certification
- Optional skill training program
- Optional leadership or management training program
The percentage of Engineers who take advantage of Optional training is:

- 0-20%: 9
- 21-40%: 3
- 41-60%: 7
- 61-80%: 2
- 81-100%: 3

Number of Utility Responses

We provide (or reimburse for) the following types of training for Operators:

- Required training to maintain Operator Certification/License: 21
- Optional skill training program: 20
- Optional leadership or management training program: 16

Number of Utility Responses
The percentage of Operators who take advantage of Optional training is:

- 0-20%: [Bar graph showing data]
- 21-40%: [Bar graph showing data]
- 41-60%: [Bar graph showing data]
- 61-80%: [Bar graph showing data]
- 81-100%: [Bar graph showing data]

Number of Utility Responses

Salary market analysis studies have shown our starting salaries (salary only, not benefits) for Engineers are:

- At Market: [Bar graph showing data]
- Below Market: [Bar graph showing data]
- Above Market: [Bar graph showing data]

Number of Utility Responses

©2008 AwwaRF. ALL RIGHTS RESERVED
Salary market analysis studies have shown our starting salaries (salary only, not benefits) for Operators are:

- **At Market**
  - Operator (Treatment): 12
  - Operator (Control Center): 10
  - Operator (Field): 8

- **Below Market**
  - Operator (Treatment): 2
  - Operator (Control Center): 1

- **Above Market**
  - Operator (Treatment): 4
  - Operator (Control Center): 6
  - Operator (Field): 6

Please choose the Confidence Level of the data you entered in the above two statements on salary market analysis:

- **Low Confidence (no real data; just estimates)**
- **Some Confidence (some supporting data exists)**
- **Moderate Confidence (data exists to support many of the entries)**
- **Good Confidence (data exists to support the majority of the entries)**
- **High Confidence (all entries are supported by actual data)**
Describe your overall compensation philosophy or strategy:

<table>
<thead>
<tr>
<th>Pay slightly above market to attract and retain exceptional employees</th>
</tr>
</thead>
<tbody>
<tr>
<td>The overall compensation strategy at our utility is to attract, motivate and retain quality employees. To drive a performance management culture that recognizes performance that is aligned with Springs Utilities strategic destination (improve customer satisfaction by managing costs). Our primary method of determining compensation uses market analysis which allows us to support organizational flexibility and responsiveness to industry trends.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Overall compensation strategy is to place salary ranges in the mid to top quarter percentile of the market</th>
</tr>
</thead>
<tbody>
<tr>
<td>We use 7 local municipalities for a annual market study of every single job title. The City's philosophy is to keep all our positions at the 75 percentile based on this annual market study. As a result, our positions are ranked either 1st or 2nd within the Phoenix metro area. We also have multi-skilled workers and compensate with a skill based pay compensation plan. For those positions we are always above the 91st position in the market for all Plant Operation positions and our Utility Service Teams that participate in the skill based pay program.</td>
</tr>
</tbody>
</table>

| We perform a compensation study every three years to bring salaries up to market. We have an annual Cost of Living adjustment for all salaries annually. Pay for Performance is now being introduced from the executive to the manager level, but is not in place for positions below manager. |

| The city generally sets salary levels to be at mid-level for the area. There has not been a desire to be at the top end of the salary levels because of the benefits package that is offered. The philosophy is that new employees need to be informed of the entire package not simply the salary range. |

<table>
<thead>
<tr>
<th>Market analysis for industry benchmarked positions; and collective bargaining agreements</th>
</tr>
</thead>
<tbody>
<tr>
<td>The primary purpose of our Salary Administration Program is to ensure that we can attract, retain and motivate quality and productive employees, as well as demonstrate that we have a credible, logical and consistent process for making salary decisions. This helps to ensure that employees receive a fair and reasonable salary for the level and quality of work they perform. The CWL salary administration program is the formal system for classifying positions and compensating employees, with specific guidance for allocation, reallocation or abolishment of positions, plan maintenance, and awarding of promotional increases outlined in personnel policies.</td>
</tr>
</tbody>
</table>

| We are committed to providing a work environment which stimulates employees to perform their tasks with the highest quality and effectiveness, both as individuals and team members. As such, fair compensation is a fundamental element of our organization and rewarding employee performance is the foundation of corporate success. We have developed a salary administration program to administer salaries in a manner intended to attract, motivate and retain the most highly qualified individuals available to effectively staff all jobs. Every three years, CWL conducts a comprehensive compensation and benefits study to ensure our total compensation package is competitive with the labor market. This study is performed by an external certified compensation management consulting group. As part of the study, all jobs are evaluated in a consistent manner and placed into an appropriate salary structure, which is fully competitive with those companies with whom the Columbus Water Works competes for employees. As a result, the relevant labor market is comprised of local/regional as well as national employers. |

| The two basic elements which comprise the Salary Administration Program are 1) Job Evaluation and Administrative Control and 2) Pay for Performance Merit Increase Guidelines. The Job Evaluation and Administrative Control component consists of salary structure evaluation and review, job descriptions, and external competitive market analysis. It is an objective method for determining the economic value of each job in the Company with systematic procedures for planning, reviewing, and controlling salary increase expenditures. The merit increase and salary change guidelines, which are aligned with the in-grade adjustment policy, are used to ensure salaries are consistent with market levels for comparable jobs and reflect varying levels of individual/team performance and contribution, with each employee's performance evaluated on an annual basis. The program provides incentives toward individual growth through a merit increase program without regard to race, color, sex, age, national origin, religion, sexual preference, or job-related disability, or protected veteran status. |

| Compensation is by union contracts. For Operators, pay is generally above that in the surrounding communities. Our plant is more complex than the suburban plants in general. The City has tried to attract good candidates and pay them well enough to entice them to stay. The retirement plan is also based on completing a career, with high penalties to leave early. |

| To recruit and retain talented staff while remaining publicly and politically acceptable |
At our utility, total compensation refers to a combination of base pay, incentive pay, and benefits. JEA maintains and administers a compensation program that will attract, reward, and retain a well-qualified workforce. Base salaries are determined by market competitiveness. Relevant market data is analyzed and compensation strategies are developed to assist in meeting business objectives while being fiscally responsible and compliant with all applicable laws and regulations. Salary bands for positions will be determined by what the market pays for comparable positions. Reasonably comparable market based salary data is important in establishing salaries that will enable JEA to attract and retain competent people. As a general philosophy, JEA will set its pay range midpoints at the 50th percentile (for non-management positions) of the market. The market is defined by the industry and region in which we compete for qualified applicants (national consideration will be given for positions which are highly specialized and not always available in our market area).

<table>
<thead>
<tr>
<th>Contract with Private Operating Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employee must meet performance standards of job description.</td>
</tr>
<tr>
<td>Maintain a comp program that is internally justified and results in a competitive position among comparable agencies.</td>
</tr>
<tr>
<td>Union employees - annual step increases up to maximum. Non-union - annual merit increases up to maximum.</td>
</tr>
<tr>
<td>Low to moderate compensation, good benefit package.</td>
</tr>
<tr>
<td>Salaries competitive and a little better than average local survey. Benefits comparable to other local utilities.</td>
</tr>
<tr>
<td>Compensation to stay above 75% of the area/region average.</td>
</tr>
<tr>
<td>We believe that people need to be paid appropriately to stay with an organization. We strive to keep our salary ranges at 50%-75% of industry standards at all times. Adjustments are made on an as-needed basis.</td>
</tr>
<tr>
<td>Dependent upon the market studies as conducted by Central HR with the surrounding counties/cities and other municipalities.</td>
</tr>
</tbody>
</table>

We routinely use the following practices to meet our need for Engineering Services:

1. Regular Full-Time Employees
2. Regular Part-Time Employees
3. Contract Employees (Full Time or Part Time)
4. Temporary Employment Services
5. Internship and Cooperative Education (Programs with Colleges and Universities)
6. Contract with Individuals Who are Retired from our Organization
7. Contract with Consulting Firm
8. Utilize City or Public Works Engineering Services

Number of Utility Responses

©2008 AwwaRF. ALL RIGHTS RESERVED
We routinely use the following practices to meet our need for Operator Services:

- Regular Full-Time Employees: [Number of Utility Responses]
- Regular Part-Time Employees: [Number of Utility Responses]
- Contract Employees (Full Time or Part Time): [Number of Utility Responses]
- Temporary Employment Services: [Number of Utility Responses]
- Internship and Cooperative Education (Programs with Colleges and Universities): [Number of Utility Responses]
- Contract with Individuals Who are Retired from our Organization: [Number of Utility Responses]
- Contract with Private Operating Service: [Number of Utility Responses]
- Contract with Consulting Firm: [Number of Utility Responses]

We are using the following practices to meet staffing needs in other areas (non-engineer, non-operator) of our organization:

- Regular Full-Time Employees: [Number of Utility Responses]
- Regular Part-Time Employees: [Number of Utility Responses]
- Contract Employees (Full Time or Part Time): [Number of Utility Responses]
- Temporary Employment Services: [Number of Utility Responses]
- Internship and Cooperative Education (Programs with Colleges and Universities): [Number of Utility Responses]
- Contract with Individuals Who are Retired from our Organization: [Number of Utility Responses]
- Contract with Consulting Firm: [Number of Utility Responses]
We have conducted a formal, quantitative “gap analysis” to identify our future staffing needs.

We utilize formal Succession Planning to build a pool of candidates qualified for key leadership/management positions that will be vacated in the next five years.
The percent of key leadership/management vacancies that are filled by candidates from the Succession Planning pool is:

- 0-20%: 16 responses
- 21-40%: 2 responses
- 41-60%: 1 response
- 61-80%: 4 responses
- 81-100%: 1 response

We utilize Replacement Planning to identify a specific individual to replace key leadership/management positions that will be vacated in the next five years.

- Never do this: 10 responses
- Done on an as-needed basis: 8 responses
- Sometimes do this; an aspect of numerous activities: 4 responses
- Typically do this: 2 responses
- Often do this; omitted only in exceptional circumstances: 1 response
- Always do this; standard operating procedure: 1 response
The percent of key leadership/management vacancies that are filled by the identified Replacement candidate is:

- 0-20%
- 21-40%
- 41-60%
- 61-80%
- 81-100%

Number of Utility Responses

We provide formal skill training programs to prepare employees for advancement.

- Never do this
- Done on an as-needed basis
- Sometimes do this; an aspect of numerous activities
- Typically do this
- Often do this; omitted only in exceptional circumstances
- Always do this; standard operating procedure

Number of Utility Responses
The percent of our workforce who participate in skill training programs annually is:

- 0-20%: [Bar Graph]
- 21-40%: [Bar Graph]
- 41-60%: [Bar Graph]
- 61-80%: [Bar Graph]
- 81-100%: [Bar Graph]

Number of Utility Responses

We provide formalized development opportunities such as executive coaching, leadership development programs, or mentoring programs to prepare employees for future leadership positions.

- Never do this: [Bar Graph]
- Done on an as-needed basis: [Bar Graph]
- Sometimes do this; an aspect of numerous activities: [Bar Graph]
- Typically do this: [Bar Graph]
- Often do this; omitted only in exceptional circumstances: [Bar Graph]
- Always do this; standard operating procedure: [Bar Graph]

Number of Utility Responses

©2008 AwwaRF. ALL RIGHTS RESERVED
The percent of our workforce who participate in formalized development executive coaching, leadership development or mentoring programs annually is:

![Bar chart showing the distribution of participation percentages.](image1.png)

- 0-20%
- 21-40%
- 41-60%
- 61-80%
- 81-100%

We have a Knowledge Management Program in place to capture critical knowledge from employees eligible for retirement in the next five years.

![Bar chart showing the formal approach levels.](image2.png)

- No formal approach
- Formality as needed
- Sometimes formal procedures
- Typically formal
- Formality established
- Formality enforced
We have a Knowledge Management Program in place to capture critical organization policies, procedures and work processes.

No formal approach
Formality as needed
Sometimes formal procedures
Typically formal
Formality established
Formality enforced

We routinely review our work processes to increase efficiency and reduce our need for labor resources.

Never do this
Done on an as-needed basis
Sometimes do this; an aspect of numerous activities
Typically do this
Often do this; omitted only in exceptional circumstances
Always do this; standard operating procedure
Our workforce planning strategy is tightly linked to our organization’s overall strategic direction.

Completing a Workforce Plan or Succession Plan was identified as a key objective in our current Strategic Plan.
<table>
<thead>
<tr>
<th>Position</th>
<th>Established (Budgeted) Number of Full-Time Equivalents</th>
<th>Current Number of Full-Time Equivalents</th>
<th>Number of Vacancies Currently Trying to Fill</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALL Utility Staff</td>
<td>870.4 517 2076 256 321 1635 276 2011 264 225 120 238 608 129 480 431 552 469 130 366 883 1275 397</td>
<td>approx 850 491 2244 238 294 1404 275 1913 253 225 120 228 570 118 433 411 539 445 125 310 727 1224 383</td>
<td>20 4 70 18 9 231 1 82 5 43 5 10 38 3 10 14 10 24 8 11 156 2 11</td>
</tr>
<tr>
<td><strong>ENGINEERING (ENTRY LEVEL)</strong></td>
<td>18 8 4 1 for 33 entry 5 none 2 10 3 9 45 2 4</td>
<td>14 8 4 1 1 19 6 5 2 10</td>
<td>4 None 14 1 2 n/a</td>
</tr>
<tr>
<td><strong>ENGINEER (SENIOR)</strong></td>
<td>34 18 222 1 12 SR 33 4 8 15 7 3 12 8 11 6 25 3 8 6 14</td>
<td>30 18 163 1 12 2 21 4 106 8 15 7 3 12</td>
<td>4 None 12 5 4 1 n/a</td>
</tr>
<tr>
<td><strong>ENGINEERING TECHNICIAN</strong></td>
<td>53 16 41 13 1 11 90 2 4 12 none 2</td>
<td>51 15 36 13 1 9 48 2 30 3 12 2</td>
<td>27 223 5 1 na</td>
</tr>
<tr>
<td><strong>OPERATOR (TREATMENT)</strong></td>
<td>60 N/A 290 5 24 17 for 149 33 no match 29 18 15 16 32 105 22 17 13 15</td>
<td>55 N/A 226 5 20 16 for 147 33 57 29 18 15 16 36 101 21 11 12</td>
<td>9 N/A 19 6 1 na</td>
</tr>
<tr>
<td><strong>OPERATOR (CONTROL CENTER)</strong></td>
<td>9 N/A 19 6 1 na 4 14 n/a 4</td>
<td>6 N/A 11 5 1 na 6 4 14 n/a 3</td>
<td>27 223 5 1 na</td>
</tr>
<tr>
<td><strong>OPERATOR (FIELD)</strong></td>
<td>29 241 5 1 na</td>
<td>29 221 5 1 na</td>
<td>2 None 42 1 2 n/a</td>
</tr>
</tbody>
</table>

Number of Vacancies Currently Trying to Fill -- ALL Utility Staff 20 4 70 18 9 231 1 82 5 43 5 10 38 3 10 14 10 24 8 11 156 2 11

Number of Vacancies Currently Trying to Fill -- ENGINEERING (ENTRY LEVEL) 4 None 14 1 2 n/a |

Number of Vacancies Currently Trying to Fill -- ENGINEER (SENIOR) 4 None 12 5 4 1 n/a |

Number of Vacancies Currently Trying to Fill -- ENGINEERING TECHNICIAN 2 None 42 1 2 n/a |

Number of Vacancies Currently Trying to Fill -- OPERATOR (TREATMENT) 5 N/A 5 4 1 for 2 treats 12 n/a |

Number of Vacancies Currently Trying to Fill -- OPERATOR (CONTROL CENTER) 3 N/A 5 1 na 5 n/a 1 |

Number of Vacancies Currently Trying to Fill -- OPERATOR (FIELD) 2 4 5 30 n/a 5 |

©2008 AwwaRF. ALL RIGHTS RESERVED
### Average Time to Fill the Position? -- ALL Utility Staff

<table>
<thead>
<tr>
<th>Position</th>
<th>Average Time to Fill</th>
<th>12</th>
<th>4-6</th>
<th>3-5</th>
<th>69 cal.</th>
<th>4 week</th>
<th>120 days</th>
<th>6 month</th>
<th>90 days</th>
<th>6 month</th>
<th>1 MONT</th>
<th>2 month</th>
<th>2 month</th>
<th>2 month</th>
<th>6 month</th>
<th>90</th>
<th>59 weeks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Time to Fill the Position? -- ENGINEERING (ENTRY LEVEL)</td>
<td>14 months s</td>
<td>6 month s</td>
<td>6</td>
<td>4-6 weeks</td>
<td>120 days</td>
<td>6 month s</td>
<td>12 months s</td>
<td>6 month s</td>
<td>8 weeks</td>
<td>12 months s</td>
<td>6 months s</td>
<td>59 weeks</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average Time to Fill the Position? -- ENGINEER (SENIOR)</td>
<td>14 months s</td>
<td>6 month s</td>
<td>6</td>
<td>3-5 months</td>
<td>6 months s</td>
<td>6 month s</td>
<td>6 months s</td>
<td>6 months s</td>
<td>6 months s</td>
<td>6 months s</td>
<td>6 months s</td>
<td>59 weeks</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average Time to Fill the Position? -- ENGINEER (TECHNICIAN)</td>
<td>10 weeks s</td>
<td>2 month s</td>
<td>6</td>
<td>3-5 months</td>
<td>6 months s</td>
<td>4 weeks</td>
<td>6 months s</td>
<td>n/a</td>
<td>2 months s</td>
<td>6 months s</td>
<td>4 months s</td>
<td>59 weeks</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average Time to Fill the Position? -- OPERATOR (TREATMENT)</td>
<td>12 weeks s</td>
<td>9 month s</td>
<td>6</td>
<td>2-4 weeks</td>
<td>90 days</td>
<td>6 month s</td>
<td>2 weeks s</td>
<td>6 months s</td>
<td>6 months s</td>
<td>6 months s</td>
<td>6 months s</td>
<td>59 weeks</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average Time to Fill the Position? -- OPERATOR (CONTROL CENTER)</td>
<td>12 weeks s</td>
<td>6 month s</td>
<td>6</td>
<td>2-4 weeks</td>
<td>6 weeks</td>
<td>n/a</td>
<td>6 weeks</td>
<td>2 month s</td>
<td>6 months s</td>
<td>6 months s</td>
<td>6 months s</td>
<td>59 weeks</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average Time to Fill the Position? -- OPERATOR (FIELD)</td>
<td>10 weeks s</td>
<td>4 weeks</td>
<td>n/a</td>
<td>6</td>
<td>n/a</td>
<td>6 weeks</td>
<td>1 month</td>
<td>2 month s</td>
<td>6 month s</td>
<td>6 month s</td>
<td>59 weeks</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Annual Turnover Rate (Most Recent 12 Months) -- ALL Utility Staff

<table>
<thead>
<tr>
<th>Position</th>
<th>Annual Turnover Rate</th>
<th>0.03</th>
<th>(11.42 %)</th>
<th>0.060</th>
<th>0.07</th>
<th>5.6</th>
<th>5.76</th>
<th>10</th>
<th>4.5</th>
<th>5</th>
<th>7.5</th>
<th>6</th>
<th>5.9</th>
<th>8</th>
<th>8</th>
<th>6.6</th>
<th>2.1</th>
<th>18</th>
<th>4.2</th>
<th>12</th>
<th>12</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Difficult to Recruit/ Hire -- ALL Utility Staff</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Difficult to Recruit/ Hire -- ENGINEERING (ENTRY LEVEL)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Difficult to Recruit/ Hire -- ENGINEER (SENIOR)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Difficult to Recruit/ Hire -- ENGINEER (TECHNICIAN)</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Difficult to Recruit/ Hire -- OPERATOR (TREATMENT)</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Difficult to Recruit/ Hire -- OPERATOR (CONTROL CENTER)</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Difficult to Recruit/ Hire -- OPERATOR (FIELD)</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Position</td>
<td>Difficult to Retain</td>
<td>Eligible to Join Union</td>
<td>Average Cost to Fill a Position (as % of Salary)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------------------------------</td>
<td>---------------------</td>
<td>------------------------</td>
<td>------------------------------------------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>ALL Utility Staff</strong></td>
<td>No, No, No, No, No</td>
<td>Yes, No, No, No, No</td>
<td>0.75, 5, 5.4, 2, 10, 0.5, 3, 20, 2, 7, 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>ENGINEERING (ENTRY LEVEL)</strong></td>
<td>No, No, No, No, No</td>
<td>Yes, Yes, Yes, No, No</td>
<td>0.75, 5, 5.4, 2, 10, 0.75, 100, 7, 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>ENGINEER (SENIOR)</strong></td>
<td>No, No, Yes, No, No</td>
<td>Yes, No, Yes, No, No</td>
<td>0.05, 5, 5.4, 2, 10, 0.75, 100, 7, 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>ENGINEERING TECHNICIAN</strong></td>
<td>No, No, No, No, No</td>
<td>Yes, Yes, Yes, No, No</td>
<td>0.75, 5, 5.4, 2, 10, 0.75, 100, 7, 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>OPERATOR (TREATMENT)</strong></td>
<td>No, No, Yes, No, No</td>
<td>Yes, Yes, Yes, No, No</td>
<td>30%, 5, 5.4, 2, 10, NA, 20, 7, 12</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>OPERATOR (CONTROL CENTER)</strong></td>
<td>No, No, Yes, No, No</td>
<td>Yes, Yes, Yes, No, No</td>
<td>30%, 5, 5.4, 2, 10, 0.5, 20, 7, 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>OPERATOR (FIELD)</strong></td>
<td>No, No, No, No, No</td>
<td>Yes, Yes, Yes, No, No</td>
<td>0.75, 5, 5.4, 2, 10, 0.5, 20, 7, 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Category</td>
<td>Average Number of Training Hours/Year</td>
<td>Average Number of Training Hours/Year</td>
<td>Average Number of Training Hours/Year</td>
<td>Average Number of Training Hours/Year</td>
<td>Average Number of Training Hours/Year</td>
<td>Average Number of Training Hours/Year</td>
<td>Average Number of Training Hours/Year</td>
<td>Average Number of Training Hours/Year</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>----------------------------------</td>
<td>---------------------------------------</td>
<td>---------------------------------------</td>
<td>---------------------------------------</td>
<td>---------------------------------------</td>
<td>---------------------------------------</td>
<td>---------------------------------------</td>
<td>---------------------------------------</td>
<td>---------------------------------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ALL Utility Staff</td>
<td>ENGINEERING (ENTRY LEVEL)</td>
<td>ENGINEER (SENIOR)</td>
<td>ENGINEERING TECHNICIAN</td>
<td>OPERATOR (TREATMENT)</td>
<td>OPERATOR (CONTROL CENTER)</td>
<td>OPERATOR (FIELD)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>40/Employee</td>
<td>40/Employee</td>
<td>40/Employee</td>
<td>40/Employee</td>
<td>40/Employee</td>
<td>40/Employee</td>
<td>40/Employee</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>40</td>
<td>32</td>
<td>40</td>
<td>32</td>
<td>40</td>
<td>32</td>
<td>40</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>40/Employee</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>20</td>
<td>20</td>
<td>60</td>
<td>20</td>
<td>50</td>
<td>20</td>
<td>20</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>44</td>
<td>20</td>
<td>20</td>
<td>40</td>
<td>12</td>
<td>24</td>
<td>20</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>40</td>
<td>20</td>
<td>20</td>
<td>40</td>
<td>12</td>
<td>24</td>
<td>20</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Number of Employees Eligible to Retire in Next 5 Years -- ALL Utility Staff</td>
<td>Number of Employees Eligible to Retire in Next 5 Years -- ENGINEERING (ENTRY LEVEL)</td>
<td>Number of Employees Eligible to Retire in Next 5 Years -- ENGINEER (SENIOR)</td>
<td>Number of Employees Eligible to Retire in Next 5 Years -- ENGINEERING TECHNICIAN</td>
<td>Number of Employees Eligible to Retire in Next 5 Years -- OPERATOR (TREATMENT)</td>
<td>Number of Employees Eligible to Retire in Next 5 Years -- OPERATOR (CONTROL CENTER)</td>
<td>Number of Employees Eligible to Retire in Next 5 Years -- OPERATOR (FIELD)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>300</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>85</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>56</td>
<td>6</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>17</td>
<td>3</td>
<td>6</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>10</td>
<td>3</td>
<td>6</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>3</td>
<td>6</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>17</td>
<td>10</td>
<td>3</td>
<td>6</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>5</td>
<td>3</td>
<td>6</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>N/A</td>
<td>2</td>
<td>6</td>
<td>7</td>
<td>5</td>
<td>10</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>N/A</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>12</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>1</td>
<td>2</td>
<td>5</td>
<td>5</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>1</td>
<td>2</td>
<td>5</td>
<td>5</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Average Tenure (in Years) -- ALL Utility Staff</td>
<td>Average Tenure (in Years) -- ENGINEERING (ENTRY LEVEL)</td>
<td>Average Tenure (in Years) -- ENGINEER (SENIOR)</td>
<td>Average Tenure (in Years) -- ENGINEERING TECHNICIAN</td>
<td>Average Tenure (in Years) -- OPERATOR (TREATMENT)</td>
<td>Average Tenure (in Years) -- OPERATOR (CONTROL CENTER)</td>
<td>Average Tenure (in Years) -- OPERATOR (FIELD)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>24.8</td>
<td>5</td>
<td>34.4</td>
<td>15</td>
<td>10</td>
<td>7.3</td>
<td>3.05</td>
<td>2.3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>30</td>
<td>4</td>
<td>16</td>
<td>3</td>
<td>3.05</td>
<td>2.3</td>
<td>2.3</td>
<td>2.3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>5</td>
<td>2.3</td>
<td>2.3</td>
<td>2.3</td>
<td>2.3</td>
<td>2.3</td>
<td>2.3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>22</td>
<td>5</td>
<td>2.3</td>
<td>2.3</td>
<td>2.3</td>
<td>2.3</td>
<td>2.3</td>
<td>2.3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>18</td>
<td>5</td>
<td>2.3</td>
<td>2.3</td>
<td>2.3</td>
<td>2.3</td>
<td>2.3</td>
<td>2.3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX B
JOB FAIR SURVEY RESULTS

Following are the results of the surveys conducted with students and young professionals (currently employed) at AWWA ACE and WEFTEC conferences.

AWWA ACE Conference and Young Professionals Committee

WEFTEC Conference and Young Professionals Committee
AWWA ACE Conference and Young Professionals Committee

Military Experience

<table>
<thead>
<tr>
<th>None</th>
<th>Currently Enlisted</th>
<th>Discharged</th>
<th>Reserves</th>
</tr>
</thead>
</table>

Number of Responses

WEFTEC Conference and Young Professionals Committee

Military Experience

<table>
<thead>
<tr>
<th>None</th>
<th>Currently Enlisted</th>
<th>Discharged</th>
<th>Reserves</th>
</tr>
</thead>
</table>

Number of Responses
The type of work completed at a water utility has (blank) appeal as the work done in other industries.

AWWA ACE Conference and Young Professionals Committee

WEFTEC Conference and Young Professionals Committee

©2008 AwwaRF. ALL RIGHTS RESERVED
Managers and Supervisors at water utilities and other public agencies are (blank) other industries in adopting forward-thinking management practices.

**AWWA ACE Conference and Young Professionals Committee**

<table>
<thead>
<tr>
<th></th>
<th>Students</th>
<th>Currently Employed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Behind</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equal to</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ahead of</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**WEFTEC Conference and Young Professionals Committee**

Managers and Supervisors at water utilities and other public agencies are (blank) other industries in adopting forward-thinking management practices.

<table>
<thead>
<tr>
<th></th>
<th>Students</th>
<th>Currently Employed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Behind</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equal to</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ahead of</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The typical retirement plans offered by utilities and other public agencies is (blank) appealing as the retirement plans offered in other industries.

**AWWA ACE Conference and Young Professionals Committee**

**WEFTEC Conference and Young Professionals Committee**
AWWA ACE Conference and Young Professionals Committee

Working at a water utility will provide the career advancement that I seek.

<table>
<thead>
<tr>
<th></th>
<th>Students</th>
<th>Currently Employed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Disagree</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disagree</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neutral</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agree</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strongly Agree</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

WEFTEC Conference and Young Professionals Committee

Working at a water utility will provide the career advancement that I seek.

<table>
<thead>
<tr>
<th></th>
<th>Students</th>
<th>Currently Employed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Disagree</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disagree</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neutral</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agree</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strongly Agree</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Too low a salary offered by a water utility is one of the key reasons I am not interested in pursuing a position in the utility industry.

AWWA ACE Conference and Young Professionals Committee

WEFTEC Conference and Young Professionals Committee
AWWA ACE Conference and Young Professionals Committee

Water utilities complete work that is worthwhile to the future of our society which is one reason I am interested in pursuing a position in the utility industry.

WEFTEC Conference and Young Professionals Committee

Water utilities complete work that is worthwhile to the future of our society which is one reason I am interested in pursuing a position in the utility industry.
AWWA ACE Conference and Young Professionals Committee

I would be interested in working for a water utility if the work offered more variety.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

WEFTEC Conference and Young Professionals Committee

I would be interested in working for a water utility if the work offered more variety.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree
AWWA ACE Conference and Young Professionals Committee

I would be interested in working for a water utility if the work enabled me to learn and add to my knowledge.

<table>
<thead>
<tr>
<th></th>
<th>Students</th>
<th>Currently Employed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Disagree</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disagree</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neutral</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agree</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strongly Agree</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

WEFTEC Conference and Young Professionals Committee

I would be interested in working for a water utility if the work enabled me to learn and add to my knowledge.

<table>
<thead>
<tr>
<th></th>
<th>Students</th>
<th>Currently Employed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Disagree</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disagree</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neutral</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agree</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strongly Agree</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
AWWA ACE Conference and Young Professionals Committee

I would be interested in working for a water utility if the workload supported my worklife balance.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

WEFTEC Conference and Young Professionals Committee

I would be interested in working for a water utility if the workload supported my worklife balance.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>
What Is Important in a Job

- Flexible Work Schedule
- Work that Enables Me to Learn and Grow
- Ten Percent More in Total Compensation
- Comprehensive Retirement Package
- Work that is Enjoyable
- Two Weeks Additional Paid Vacation
- Work That's Personally Stimulating
- Comprehensive Benefits Package
- Work That is Worth While to Society
- Flexible Workplace (e.g. working conditions/environment, etc.)

Number of Respondent's Rating 1, 2, or 3)
APPENDIX C
SECONDARY RESEARCH

UNIVERSITY OF NORTH CAROLINA REPORT: SUCCESSION DEMOGRAPHY FOR THE WATER INDUSTRY

CONTENTS

EXECUTIVE SUMMARY ................................................................. 131
Introduction ................................................................................... 131
Profile of the Current Water Industry Workforce.......................... 133
Sources of Future Employees......................................................... 137
Summary ....................................................................................... 156
EXECUTIVE SUMMARY

This report identifies four pools of potential replacement workers for the impending wave of retirements in water utility industry. High school graduates, who have successfully completed either the vocational education or general course of study track, and community college graduates, who have earned associate’s degrees in engineering, are ideal candidates for plant operator jobs. Four year colleges and universities with accredited bachelor’s degree programs in engineering remain the primary source of engineering talent. But, owing to fierce competition for this talent from other public sector organizations and private sector firms, the water utility industry will have to recruit through various engineering professional associations and through affinity programs that represent older workers, displaced workers, and military veterans to meet its workforce needs of the future.

INTRODUCTION

The aging or “graying” of the American work force, that is, the increasing share that is 50 and older, constitutes a major threat to U.S. competitiveness in the years ahead. Between 1946 and 1964, 76 million Americans were born, which constituted the “baby boom.” The number swells to 84 million when U.S. immigrants born between 1946 and 1964 are added. Over the next 15 years, approximately 12,000 boomers will turn 50 daily. Within four years, the oldest boomers will begin reaching 65 and aging out of the labor market.

This will constitute a demographic exodus of enormous implications for the human resource needs of organizations of all types. Commenting on this impending wave of retirements, a 2005 Government Accountability Office (GAO) report, states that, Demographic changes pose serious challenges of the employers, the economy and older Americans. As the baby boomers near traditional retirement ages, the loss of experienced workers could have adverse effects on productivity and economic growth.

The GAO report goes on to state that, “all areas of the labor market are likely to be affected by the aging of the workforce.”1

The water industry is proactively addressing the issue of workforce succession planning and management. The industry recognizes that the aging of its existing workforce combined with a much smaller “baby bust” generation of potential workers will make recruiting the next generation of professionals in the water treatment industry a major challenge.

Effective succession planning requires knowledge of current patterns of employment and pay in the industry. It also requires foresight into targeted strategies that are most likely to facilitate successful recruitment of the next generation of workers.

In this report, we focus on succession planning for two key positions in the water and waste water industry: system engineers (primarily civil and environmental engineers) and water plant operators. These two positions have very different education and training requirements and thus will require different recruitment strategies.

Engineering positions require at least a university degree from an accredited engineering program. Water plant operator positions require less formal education—typically a high school degree. Plant operators generally acquire the requisite skills through on-the-job training and via certification programs.

Pay differences will affect the geographic range of recruitment for the two positions. Given the higher salary levels, the geographic scope of recruitment for engineers can be regional, national, and perhaps even international. Because the pay is substantially lower, relocation is probably not an economically reasonable or feasible option for people interested in plant operator jobs and therefore recruitment will likely have to be more localized.

We begin this assessment with a profile of the demographic and economic characteristics of current engineers and plant operators in the water and waste water industry. We then identify targets of opportunity to recruit the next generation of water industry engineers and plant operators. In addition to traditional recruitment pools for plant operators (i.e., high school and community college graduates) and engineers (i.e., four year college graduates of accredited engineering programs), we focus on heretofore largely untapped pools of potential recruits—older workers, military veterans, and dislocated workers.

Our assessment of the current workforce relies on empirical data from multiple sources, including the American Community Survey, the Bureau of Labor Statistics, and a recent survey of water utilities workforce sponsored by the Water Environment Research Foundation (WERF) and the American Water Works Association Research Foundation (AwwaRF). To identify potential recruitment targets of opportunity for the water industry, we rely on data compiled by the National Center for Education Statistics, the National Science Foundation, the Bureau of Labor Statistics, and a host of professional associations and affinity programs.

---

2 Succession Planning for a Vital Workforce in the Information Age (2005) MA Olstein, DL Marden, JG Voeller, JD Jennings, PH Hannan, and D. Brinkman, Awwa Research Foundation and WERF. The survey was sent primarily to larger utilities and therefore the results are not necessarily representative of the industry. Nevertheless, the survey provided valuable information on the demographic composition of water and waste water industry workforce.
Profile of the Current Water Industry Workforce

In a recent survey, Olstein, et al found that the average worker in water utility industry (44.7 years of age) is older than the average worker in all utilities (44.2 years of age) and in all U.S. industries (40 years of age). With an average age of 45, water utilities workers are highly concentrated in the demographic “bulge” that constitutes the baby-boomer population in America (see Figure C-1). Given this high average age, it is not surprising that, at the time of the Olstein et al survey, 24 percent of water utility workers were eligible for retirement within 5 years and 37 percent were eligible for retirement in ten years.

Analysis of the Census Bureau’s 2005 American Community Survey (ACS) data confirms the findings of the Olstein, et al study. In 2005, the average civil engineer in the water and waste water industry was 40.2 years old. The typical plant operator was 41.6 years old. Unfortunately, the ACS sample was not adequate to obtain stable estimates below the national level for civil and environmental engineers working in water and waste water utilities. However, the sample was large enough to obtain the average age of plant operators by region and for metropolitan areas and non-metropolitan areas in the U.S.

![Population by Sex and Age, United States - 2000](image)

*Source: U.S. Census Bureau (2005) American Community Survey*

*Figure C-1. Population by Sex and Age*

3 Lack of sufficient sample size to obtain estimates is a problem when using Census, Bureau of Labor Statistics, of Statistics Canada to obtain data for employee characteristics
Plant operators in the Northeast (average 49.6 years old) and in the West (average 46.9 years old) are significantly older than plant operators in the Midwest (average 41.2 years old) and the South (average 40.0 years old). Similarly, plant operators in metropolitan areas (average 42.4 years old) are older than plant operators in non-metropolitan areas (average 36.9 years old).

Thus succession planning—at least with regard to plant operators—is a slightly more pressing issue in the Northeast and West than it is in the South and West regions. It is also more of an issue in metropolitan areas than in non-metropolitan areas.

At the same time that the water industry workforce is aging, water utilities’ personnel—paralleling national labor-force trends—is slowly becoming more diverse racially and ethnically. The Olstein, et al survey revealed that African Americans are slightly over-represented and Latinos are slightly under-represented in the water utility industry. This existing diversity is an important factor to build upon in attempting to recruit the next generation of workers. While local racial and ethnic composition is a factor in recruiting minorities, the increasing diversity makes inclusion a central strategy for water utilities.

Notwithstanding the increasing diversity along race/ethnic lines, an enormous sex ratio or gender imbalance continues to exist in the water utilities workforce. Many more men than women work in the industry. Commenting on this characteristic of the industry workforce, Olstein et al note that, “Gender imbalance is an area where there is a potential for a double payoff. With women representing more than 55% of college attendees, increasing female representation in the utility workforce could ease [the shortage of technical utility workers].”

Effective succession planning must consider the role of competitive salaries in recruiting the next generation of workers. The Bureau of Labor Statistics (BLS) has detailed salary data for all occupations in the North American Industrial Classification System. Under this classification system, water utilities are included in the broad category of Water, Sewage and Other Systems occupations.

Most of the engineers as well as the plant and systems operators working in water systems are employed by local governments. It is not possible to obtain estimates of either the number or salaries of local government engineers working specifically in water systems. However, employment numbers and salaries are available for all engineers employed by local governments, which are reproduced in Table C-1. While the salaries of civil, environmental and other engineers working in local governments may not be specifically for water systems engineers, they do provide general salary guidance for the industry.

It is much safer to conclude that most of the plant and systems operators employed by local governments—almost 82,000 in 2005--are working either in water or waste water plants. As Table C-1 shows, their average annual salary was $35,800 in 2005. Plant and systems operators are also employed in state and federal government positions. While the numbers are too small to be released publicly, the salaries of plant and systems operators employed by state and federal governments are significantly higher than their counterparts employed by local governments (Table C-1).

In Canada, as Table C-1 shows, there are an estimated 7,200 plant and systems operators in the water and sewage utility industry. The average annual salary in the industry was $47,189 (Canadian) in 2005.
### Table C-1


<table>
<thead>
<tr>
<th>Occupation</th>
<th>Estimated Number</th>
<th>Median Hourly Wage</th>
<th>Mean Hourly Wage</th>
<th>Mean Annual Wage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Civil Engineer</td>
<td>28,770</td>
<td>$33.68</td>
<td>$34.07</td>
<td>$70,870</td>
</tr>
<tr>
<td>Electrical Engineer</td>
<td>2,690</td>
<td>$35.95</td>
<td>$36.27</td>
<td>$75,440</td>
</tr>
<tr>
<td>Environmental Engineer</td>
<td>4,680</td>
<td>$29.93</td>
<td>$30.64</td>
<td>$63,720</td>
</tr>
<tr>
<td>Industrial Engineer</td>
<td>610</td>
<td>$31.98</td>
<td>$34.08</td>
<td>$70,890</td>
</tr>
<tr>
<td>Mechanical Engineer</td>
<td>940</td>
<td>$32.60</td>
<td>$33.37</td>
<td>$69,420</td>
</tr>
<tr>
<td>All Other Engineers</td>
<td>3,640</td>
<td>$37.58</td>
<td>$36.74</td>
<td>$76,430</td>
</tr>
<tr>
<td>Plant and Systems Operators, Utility Sector, NAICS 221300</td>
<td>9,930</td>
<td>$16.11</td>
<td>$16.77</td>
<td>$34,890</td>
</tr>
<tr>
<td>Plant and Systems Operators, Local Governments, NAICS 999300</td>
<td>81,970</td>
<td>$16.77</td>
<td>$17.25</td>
<td>$35,800</td>
</tr>
<tr>
<td>Plant and Systems Operators, State Government, NAICS 999200</td>
<td>670</td>
<td>$17.86</td>
<td>$20.04</td>
<td>$41,680</td>
</tr>
<tr>
<td>Plant and Systems Operators, Federal Government, NAICS 999100</td>
<td>*</td>
<td>$22.76</td>
<td>$23.05</td>
<td>$47,940</td>
</tr>
<tr>
<td>Plant and Systems Operators, Canada Utility Sector, NAICS 221300</td>
<td>7,200</td>
<td>$25.00**</td>
<td>$23.54**</td>
<td>$47,189**</td>
</tr>
<tr>
<td>Plant and Systems Operators, Canada National Estimate</td>
<td>8,600</td>
<td>$24.50</td>
<td>$23.15**</td>
<td>$46,723</td>
</tr>
</tbody>
</table>


**Statistics Canada provided the Plant and Systems Operators data.**

* Suppressed due to small number in estimate.
** Canadian dollars.
The BLS estimates employment and salaries separately for those in the private sector of the Utility Industry. Table C-2 presents the 2005 BLS estimates for the private utility sector, including the median hourly wage, the mean hourly wage, and the mean annual wage for civil, electrical, environmental, industrial, mechanical and all other (unspecified) engineers, as well as plant and systems operators. Wage data for civil engineering technicians, environmental engineering technicians, and survey and mapping technicians are also included in the table. These technician estimates are included because we think investments in continuing education for individuals in these occupational categories may be a component of a broader strategy for creating the next generation of water industry engineering professionals.

Table C-2

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Estimated Number</th>
<th>Median Hourly Wage</th>
<th>Mean Hourly Wage</th>
<th>Mean Annual Wage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Civil Engineer</td>
<td>250</td>
<td>$31.80</td>
<td>$34.71</td>
<td>$72,190</td>
</tr>
<tr>
<td>Electrical Engineer</td>
<td>70</td>
<td>$36.30</td>
<td>$34.60</td>
<td>$71,960</td>
</tr>
<tr>
<td>Environmental Engineer</td>
<td>130</td>
<td>$32.12</td>
<td>$33.23</td>
<td>$69,120</td>
</tr>
<tr>
<td>Industrial Engineer</td>
<td>60</td>
<td>$35.11</td>
<td>$35.74</td>
<td>$74,350</td>
</tr>
<tr>
<td>Mechanical Engineer</td>
<td>50</td>
<td>$32.19</td>
<td>$33.79</td>
<td>$70,290</td>
</tr>
<tr>
<td>All Other Engineers</td>
<td>*</td>
<td>$29.69</td>
<td>$31.32</td>
<td>$65,140</td>
</tr>
<tr>
<td>Plant and Systems Operators</td>
<td>9,930</td>
<td>$16.11</td>
<td>$16.77</td>
<td>$34,890</td>
</tr>
<tr>
<td>Civil Engineering Technician</td>
<td>120</td>
<td>$22.24</td>
<td>$22.25</td>
<td>$46,280</td>
</tr>
<tr>
<td>Environmental Engineering Technician</td>
<td>*</td>
<td>$17.86</td>
<td>$18.47</td>
<td>$38,420</td>
</tr>
<tr>
<td>Survey and mapping Technician</td>
<td>90</td>
<td>$15.45</td>
<td>$16.66</td>
<td>$34,650</td>
</tr>
</tbody>
</table>

Source: http://www.bls.gov/

* Suppressed due to small number in estimate.

In 2005, as Table C-2 shows, the average annual salary for all engineers in this industry was around $70,000. Environmental engineers ($69,120) were at the low end and
industrial engineers ($74,350) were at the high end of the industry salary spectrum.\(^4\) For each type of engineer—civil, electrical, and environmental, the average annual salary in the utility industry was at or above the national average in 2005. Civil engineers in the Water, Sewage and Other Systems class, for example, had an average annual salary of $72,190 while the national average for civil engineers was $69,480. These relatively higher average salaries could be due to the longer tenure of utility employees relative to all civil, electrical and environmental engineers.

Industrial engineers are the highest paid engineers in the utility industry, but their average salary was lower than the national average salary for industrial engineers in 2005. Mechanical and “Other” engineers also have lower than average salaries. These are the three smallest engineering specialties in the industry.

As Table C-2 shows, civil engineering technicians in this industry had significantly higher average annual salaries ($46,280) compared to the national average ($40,780) in 2005. However, the average annual salaries of environmental engineering technicians and survey and mapping technicians were lower than the national average. BLS estimates that there are almost 10,000 plant and systems operators (see www.bls.gov/oco/ocos229.htm for the BLS occupation description) in the water and sewage utility industry, and their average annual salary was $34,890 in 2005, slightly lower than plant and systems operators employed by local governments.

Regional estimates specific to these occupations within the water and sewage utility industry are not available from BLS. However, BLS does have estimates for occupations across all industries for regions, states, and metropolitan areas (www.bls.gov/ncs/ocs/compub.htm#UT). While highly unlikely to be relevant for the engineering positions, these data may be useful for the systems operators in the water and sewage industry.

Clearly, as the foregoing suggests, retirement of water utility workers is becoming a challenge for the industry. With impending retirements, water utilities will lose the most-experienced workers with the greatest institutional and operational knowledge. An effective strategy not only to replace retiring workers but also to ensure successful knowledge transfer between the old and new generation of workers is urgently needed. Successful recruitment, especially of engineers, will require that the salaries are competitive.

**Sources of Future Employees**

Our conceptual framework for water industry worker recruitment is depicted in Figure C-2. It identifies four institutional targets for recruiting the next generation of plant operators and engineers: high schools, community colleges, four year colleges and universities, and professional associations and affinity groups.

---

\(^4\) Appendix 1 gives the 2005 BLS estimates for employment and wages for all of these occupations except plant and systems operators.
As noted previously, a high school degree is the entry-level education for many water systems operator positions. Thus, recruitment in high schools may be an important first target. Non-college bound high school graduates are probably most appropriate recruitment targets for plant operator positions. Among this group, those who have successfully completed the vocational/technical and the general course of study tracks in high school probably should be the targets of recruitment efforts.

BLS data on college enrollment and work activity of 2005 high school graduates provides insights into the size and composition of the non-college bound pool of U.S. high school graduates. As Table C-3 shows, almost one-third (31% or 841,000) of the 2.7 million high school graduates in 2005 did not enroll in college. Men and women each made up roughly half of this subgroup of high school graduates. And while whites made of the numerical majority (656,000), blacks (153,000) and Hispanics (179,000) were represented in significant numbers to ensure some race/ethnic diversity if concerted effort is put into recruiting from this pool for the water industry.
Table C-3
2005 High School Graduates

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Civilian Non-Institutional Population</th>
<th>Not Enrolled in College</th>
<th>Percent Not Enrolled in College</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total 2005 High School Graduates (1)</td>
<td>2,675</td>
<td>841</td>
<td>31.4%</td>
</tr>
<tr>
<td>Sex:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td>1,262</td>
<td>423</td>
<td>33.5%</td>
</tr>
<tr>
<td>Women</td>
<td>1,414</td>
<td>418</td>
<td>30.0%</td>
</tr>
<tr>
<td>Race/Ethnicity:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>2,147</td>
<td>656</td>
<td>30.6%</td>
</tr>
<tr>
<td>Black or African American</td>
<td>354</td>
<td>153</td>
<td>43.2%</td>
</tr>
<tr>
<td>Asian</td>
<td>80</td>
<td>10</td>
<td>12.5%</td>
</tr>
<tr>
<td>Hispanic or Latino Ethnicity</td>
<td>390</td>
<td>179</td>
<td>45.9%</td>
</tr>
</tbody>
</table>

Numbers in Thousands
(1) Data refer to persons who graduated from high school between October 2004 and October 2005.


Community colleges constitute another institutional target, particularly those offering associate’s degrees in engineering. Graduates with an associate degree in engineering probably can be recruited initially for plant operator positions, especially if water utilities are willing to invest in continuing education programs for these individuals. Even though the pay is relatively low, individuals with associate’s degrees in engineering may be inclined to take plant operator jobs if the opportunity for career growth and development is apparent. Through such investments in continuing education water utilities may be able to “grow their own” next generation of professional engineers.

Between 1995 and 2004, as Table C-4 shows, community colleges awarded on average 1,712 associate’s degrees in engineering annually. The majority of these degrees were awarded to men (an average of 1,635 annually). The number of associate’s degrees in engineering awarded to women was on average much smaller (304 annually). While data do not exist on the race/ethnic composition of the recipients of associate’s degrees in engineering, Table C-5 lists the leading institutions awarding such degrees to various race/ethnic groups. Water utilities will have to forge strategic alliances with these institutions in order to recruit graduates with associate’s degrees in engineering.
Table C-4
Associate's Degrees in Engineering, by sex: 1995–2004

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>2,285</td>
<td>2,048</td>
<td>1,888</td>
<td>2,107</td>
<td>1,730</td>
<td>1,791</td>
<td>1,647</td>
<td>1,816</td>
<td>2,140</td>
</tr>
<tr>
<td>Male</td>
<td>1,973</td>
<td>1,779</td>
<td>1,617</td>
<td>1,784</td>
<td>1,492</td>
<td>1,494</td>
<td>1,375</td>
<td>1,527</td>
<td>1,665</td>
</tr>
<tr>
<td>Female</td>
<td>307</td>
<td>269</td>
<td>271</td>
<td>323</td>
<td>238</td>
<td>297</td>
<td>271</td>
<td>269</td>
<td>475</td>
</tr>
</tbody>
</table>

Note: Data is not available for 1999.

Source: National Science Foundation, Division of Science Resource Statistics, Special Tabulation
### Table C-5

Science & Engineering Associate's Degrees Awarded by Leading Institutions, by Race/Ethnicity of Minority Graduates: 2000–2004

<table>
<thead>
<tr>
<th>Academic institution</th>
<th>Associate's degrees</th>
<th>Academic institution</th>
<th>Associate's degrees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asian/Pacific Islander</td>
<td></td>
<td>Black</td>
<td></td>
</tr>
<tr>
<td>All institutions</td>
<td>25,252</td>
<td>All institutions</td>
<td>43,641</td>
</tr>
<tr>
<td>Leading institutions</td>
<td>7,017</td>
<td>Leading institutions</td>
<td>11,472</td>
</tr>
<tr>
<td>Heald College San Jose</td>
<td>793</td>
<td>Technical Career Institutes</td>
<td>1,244</td>
</tr>
<tr>
<td>Honolulu Community College</td>
<td>783</td>
<td>ECPI College of Technology</td>
<td>1,168</td>
</tr>
<tr>
<td>Heald College San Francisco</td>
<td>542</td>
<td>Community College of the Air Force</td>
<td>1,088</td>
</tr>
<tr>
<td>Sacramento City College</td>
<td>470</td>
<td>CUNY New York City Technical College</td>
<td>1,006</td>
</tr>
<tr>
<td>Technical Career Institutes</td>
<td>386</td>
<td>Kaiser College</td>
<td>789</td>
</tr>
<tr>
<td>San Joaquin Delta College</td>
<td>349</td>
<td>Katharine Gibbs School New York City</td>
<td>672</td>
</tr>
<tr>
<td>Heald College Concord</td>
<td>342</td>
<td>DeVry College of Technology</td>
<td>521</td>
</tr>
<tr>
<td>CUNY New York City Technical College</td>
<td>341</td>
<td>Robert Morris College (Chicago, IL)</td>
<td>520</td>
</tr>
<tr>
<td>Laney College</td>
<td>308</td>
<td>Essex County College</td>
<td>513</td>
</tr>
<tr>
<td>DeVry College of Technology</td>
<td>297</td>
<td>ECPI Technical College (Richmond, VA)</td>
<td>481</td>
</tr>
<tr>
<td>Heald College Hayward</td>
<td>297</td>
<td>Virginia College Birmingham</td>
<td>478</td>
</tr>
<tr>
<td>CUNY Queensborough Community College</td>
<td>294</td>
<td>Strayer University Washington</td>
<td>441</td>
</tr>
<tr>
<td>CUNY LaGuardia Community College</td>
<td>279</td>
<td>CUNY Bronx Community College</td>
<td>383</td>
</tr>
<tr>
<td>Riverside Community College</td>
<td>261</td>
<td>Merritt College</td>
<td>362</td>
</tr>
<tr>
<td>College of Alameda</td>
<td>223</td>
<td>CUNY Borough of Manhattan Community College</td>
<td>357</td>
</tr>
<tr>
<td>Santa Ana College</td>
<td>216</td>
<td>CUNY Kingsborough Community College</td>
<td>352</td>
</tr>
<tr>
<td>Solano County Community College District</td>
<td>215</td>
<td>Tidewater Community College</td>
<td>310</td>
</tr>
<tr>
<td>DeVry University (Pomona, CA)</td>
<td>209</td>
<td>Central Texas College</td>
<td>302</td>
</tr>
<tr>
<td>Northern Virginia Community College</td>
<td>208</td>
<td>DeVry University (Decatur, GA)</td>
<td>293</td>
</tr>
<tr>
<td>Ohiow College</td>
<td>204</td>
<td>Riverside Community College</td>
<td>292</td>
</tr>
<tr>
<td>Other institutions</td>
<td>18,235</td>
<td>Other institutions</td>
<td>32,169</td>
</tr>
</tbody>
</table>

**Hispanic**

<table>
<thead>
<tr>
<th>Academic institution</th>
<th>Associate's degrees</th>
<th>Academic institution</th>
<th>Associate's degrees</th>
</tr>
</thead>
<tbody>
<tr>
<td>All institutions</td>
<td>42,367</td>
<td>All institutions</td>
<td>4,643</td>
</tr>
<tr>
<td>Leading institutions</td>
<td>10,689</td>
<td>Leading institutions</td>
<td>1,593</td>
</tr>
<tr>
<td>Technical Career Institutes</td>
<td>1,225</td>
<td>Diné College</td>
<td>322</td>
</tr>
<tr>
<td>Riverside Community College</td>
<td>816</td>
<td>Oglala Lakota College</td>
<td>137</td>
</tr>
<tr>
<td>South Texas Community College</td>
<td>783</td>
<td>Eastern Oklahoma State College</td>
<td>99</td>
</tr>
<tr>
<td>Huertas Junior College</td>
<td>692</td>
<td>Blackfeet Community College</td>
<td>89</td>
</tr>
<tr>
<td>Citrus College</td>
<td>638</td>
<td>San Juan College</td>
<td>82</td>
</tr>
<tr>
<td>ITT Technical Institute (Torrance, CA)</td>
<td>577</td>
<td>Tulsa Community College</td>
<td>76</td>
</tr>
<tr>
<td>CUNY LaGuardia Community College</td>
<td>539</td>
<td>Haskell Indian Nations University</td>
<td>71</td>
</tr>
<tr>
<td>ITT Technical Institute (West Covina, CA)</td>
<td>472</td>
<td>Northeastern Oklahoma Agricultural and Mech Coll</td>
<td>69</td>
</tr>
<tr>
<td>Texas State Technical College Harlingen</td>
<td>472</td>
<td>Oklahoma City Community College</td>
<td>66</td>
</tr>
<tr>
<td>Katharine Gibbs School New York City</td>
<td>446</td>
<td>Albuquerque Technical Vocational Institute</td>
<td>64</td>
</tr>
<tr>
<td>DeVry College of Technology</td>
<td>444</td>
<td>Carl Albert State College</td>
<td>64</td>
</tr>
<tr>
<td>CUNY New York City Technical College</td>
<td>437</td>
<td>DeVry University (Phoenix, AZ)</td>
<td>60</td>
</tr>
<tr>
<td>CUNY Bronx Community College</td>
<td>437</td>
<td>ITT Technical Institute (Albuquerque, NM)</td>
<td>58</td>
</tr>
<tr>
<td>San Jacinto College Central</td>
<td>431</td>
<td>Seminole State College</td>
<td>53</td>
</tr>
<tr>
<td>ITT Technical Institute (Houston, TX)</td>
<td>418</td>
<td>Murray State College</td>
<td>52</td>
</tr>
<tr>
<td>ITT Technical Institute (Sylmar, CA)</td>
<td>386</td>
<td>Robeson Community College</td>
<td>52</td>
</tr>
<tr>
<td>Southwestern College (Chula Vista, CA)</td>
<td>385</td>
<td>College of the Redwoods</td>
<td>50</td>
</tr>
<tr>
<td>Mt San Jacinto College</td>
<td>384</td>
<td>Oklahoma State University Okmulgee</td>
<td>44</td>
</tr>
<tr>
<td>ITT Technical Institute (San Bernardino, CA)</td>
<td>356</td>
<td>Mt San Jacinto College</td>
<td>43</td>
</tr>
<tr>
<td>Albuquerque Technical Vocational Institute</td>
<td>351</td>
<td>Northern Oklahoma College</td>
<td>42</td>
</tr>
<tr>
<td>Other institutions</td>
<td>31,678</td>
<td>Other institutions</td>
<td>3,050</td>
</tr>
</tbody>
</table>

**NOTE:** S&E includes science and engineering technologies and interdisciplinary fields. Institutions awarding the same number of degrees are listed alphabetically.

Four year colleges and universities with accredited engineering programs have in the past and will continue in the future to be the primary institutional targets for recruiting engineering professionals.

Engineering Trends, a consulting firm specializing in engineering education, monitors undergraduate enrollment in engineering by discipline. Figure C-3 show the trends in enrollment in the major disciplines, including civil engineering. The long-term trend shows fluctuation around 40,000 students. The short-term trend for civil engineers is upward, with approximately 40,000 students enrolled in 2004. The short-run trends for two of the other major disciplines hired by water utilities—industrial and electrical—are relatively flat, while enrollments in mechanical engineering have increased.


Figure C-3: Enrollment Trends in Major Engineering Disciplines
Engineering Trends classifies environmental engineering as a smaller discipline. Trends in undergraduate enrollment in these smaller engineering disciplines are shown in Figure C-4. Undergraduate enrollment in environmental engineering rose sharply in the mid-1990s, before dropping to a level under 2,000.5


Figure C-4: Enrollment Trends in Smaller Engineering Disciplines

Since 1995, according to the National Science Foundation (NSF), the pool of new talent entering the engineering marketplace, that is, the number of individuals with newly minted bachelor’s degrees in engineering, has averaged about 62,000 annually (Table C-6).

5 It should be noted that some university civil engineering programs are now civil and environmental engineering programs (e.g. Princeton and Cornell). Also, there may be more environmental engineers in the pipeline than undergraduate enrollment alone indicates. The American Academy of Environmental Engineers has a certification program open to all disciplines, and individuals with an undergraduate degree in another discipline can pursue graduate education in environmental engineering to specialize.
In 2004, the latest year for which statistics are available, nearly 65,000 bachelor’s degrees in engineering were awarded in the U.S., representing a 2.1% increase on over the number awarded in 1995 (63,371).

Table C-6
Bachelor's Degrees Awarded in Engineering by Sex, Citizenship, and Race/Ethnicity: 1995–2004

<table>
<thead>
<tr>
<th></th>
<th>All Engineers</th>
<th>Civil Engineers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Engineering Population</td>
<td>557,632</td>
<td>93,118</td>
</tr>
<tr>
<td>Average Number Per Year</td>
<td>61,959</td>
<td>10,346</td>
</tr>
<tr>
<td>Percentage Female</td>
<td>19.4%</td>
<td>22.5%</td>
</tr>
<tr>
<td>Percentage White</td>
<td>66.4%</td>
<td>74.6%</td>
</tr>
<tr>
<td>Percentage Asian/Pacific Islander</td>
<td>11.4%</td>
<td>7.0%</td>
</tr>
<tr>
<td>Percentage Black</td>
<td>4.9%</td>
<td>3.4%</td>
</tr>
<tr>
<td>Percentage Hispanic</td>
<td>6.6%</td>
<td>7.7%</td>
</tr>
<tr>
<td>Percentage American Indian/Alaskan Native</td>
<td>0.5%</td>
<td>0.6%</td>
</tr>
<tr>
<td>Percentage Other or Unknown Race/Ethnicity</td>
<td>2.9%</td>
<td>2.6%</td>
</tr>
<tr>
<td>Percentage Temporary Resident</td>
<td>7.4%</td>
<td>4.0%</td>
</tr>
</tbody>
</table>

Note: Data not available for 1999


The trend for civil engineers basically parallels the trend for all engineers. The number of civil engineers entering the market place since 1995 has averaged about 10,000 annually (Table C-6). In 2004, 9,399 bachelor’s degrees in civil engineering were awarded.

During this period, fundamental shifts in the composition of the pool of people earning bachelor’s degrees in engineering were underway (Table C-7). Between 1995 and 2004, the number of male and white engineering degree recipients declined by 2.1% (1,003 fewer degrees) and 4.4% (1,909 fewer degrees), respectively. Offsetting these losses were increases in the number of women (2,307 more degree recipients), individuals of other or unknown race/ethnicity (1,338 more degree recipients), Asian-Pacific Islanders (840 more degree recipients), Hispanics (819 more degree recipients), Blacks (367 more degree recipients), and American Indians/Alaskan Natives (112 more degree recipients) earning bachelor’s degrees in engineering between 1995 and 2004.
### Table C-7

Percent Changes in Bachelor's Degrees Awarded in Engineering by Sex, Citizenship, and Race/Ethnicity: 1995–2004

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>63,371</td>
<td>64,675</td>
<td>1,304</td>
<td>2.1%</td>
</tr>
<tr>
<td>Sex:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>52,421</td>
<td>51,418</td>
<td>-1,003</td>
<td>-1.9%</td>
</tr>
<tr>
<td>Female</td>
<td>10,950</td>
<td>13,257</td>
<td>2,307</td>
<td>21.1%</td>
</tr>
<tr>
<td>Race/Ethnicity:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>43,766</td>
<td>41,857</td>
<td>-1,909</td>
<td>-4.4%</td>
</tr>
<tr>
<td>Asian/Pacific Islander</td>
<td>6,785</td>
<td>7,625</td>
<td>840</td>
<td>12.4%</td>
</tr>
<tr>
<td>Black or African American</td>
<td>2,845</td>
<td>3,212</td>
<td>367</td>
<td>12.9%</td>
</tr>
<tr>
<td>Hispanic or Latino Ethnicity</td>
<td>3,651</td>
<td>4,470</td>
<td>819</td>
<td>22.4%</td>
</tr>
<tr>
<td>American Indian/Alaskan Native</td>
<td>221</td>
<td>333</td>
<td>112</td>
<td>50.7%</td>
</tr>
<tr>
<td>Other or Unknown Race/Ethnicity</td>
<td>1,293</td>
<td>2,631</td>
<td>1,338</td>
<td>103.5%</td>
</tr>
<tr>
<td>Temporary Resident</td>
<td>4,810</td>
<td>4,547</td>
<td>-263</td>
<td>-5.5%</td>
</tr>
</tbody>
</table>

Note: Data not available for 1999


Figure C-5 illustrates the impact of these trends on the race/ethnic composition of engineers entering in the U.S. marketplace. Between 1995 and 2004, the white share of engineers declined from 75% to 70%. In 2004, nonwhites accounted for about 30% of the engineers entering the U.S. marketplace. Especially noteworthy were the growing shares of Hispanics and Asians who earned bachelor’s degrees in engineering.
Since 1995, about 10,000 women with bachelor’s degrees in engineering have entered the U.S. marketplace annually. Paralleling the increasing diversity of the overall pool of engineering graduates, female engineering degree recipients have also become more diverse. As Figure C-6 shows, Asian, Black, Hispanic, and other minority women, including temporary residents from abroad (i.e., immigrant women), earned a greater share of engineering degrees in 2004 than in 1995.


Figure C-5. Bachelor's Degrees Awarded in Engineering by Race/Ethnicity: 1995–2004

Since 1995, about 10,000 women with bachelor’s degrees in engineering have entered the U.S. marketplace annually. Paralleling the increasing diversity of the overall pool of engineering graduates, female engineering degree recipients have also become more diverse. As Figure C-6 shows, Asian, Black, Hispanic, and other minority women, including temporary residents from abroad (i.e., immigrant women), earned a greater share of engineering degrees in 2004 than in 1995.


Figure C-5. Bachelor's Degrees Awarded in Engineering by Race/Ethnicity: 1995–2004

Since 1995, about 10,000 women with bachelor’s degrees in engineering have entered the U.S. marketplace annually. Paralleling the increasing diversity of the overall pool of engineering graduates, female engineering degree recipients have also become more diverse. As Figure C-6 shows, Asian, Black, Hispanic, and other minority women, including temporary residents from abroad (i.e., immigrant women), earned a greater share of engineering degrees in 2004 than in 1995.


Figure C-5. Bachelor's Degrees Awarded in Engineering by Race/Ethnicity: 1995–2004

Since 1995, about 10,000 women with bachelor’s degrees in engineering have entered the U.S. marketplace annually. Paralleling the increasing diversity of the overall pool of engineering graduates, female engineering degree recipients have also become more diverse. As Figure C-6 shows, Asian, Black, Hispanic, and other minority women, including temporary residents from abroad (i.e., immigrant women), earned a greater share of engineering degrees in 2004 than in 1995.


Figure C-6. Bachelor's Degrees Awarded in Engineering to Women by Citizenship and Race/Ethnicity: 1995–2004

Engineering schools are widely distributed throughout the country. Those schools which are known for producing the largest number of male and female engineers as well as the largest number of minority engineers are reproduced in Tables C-8 and C-9.
Table C-8
Science & Engineering Bachelor's Degrees Awarded by Leading Institutions by Sex:
2000–2004

<table>
<thead>
<tr>
<th>Academic institution</th>
<th>Bachelor's degrees</th>
<th>Academic institution</th>
<th>Bachelor's degrees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>Male</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All institutions</td>
<td>1,062,900</td>
<td>All institutions</td>
<td>1,041,313</td>
</tr>
<tr>
<td>Leading institutions</td>
<td>265,782</td>
<td>Leading institutions</td>
<td>305,716</td>
</tr>
<tr>
<td>University of California Los Angeles</td>
<td>12,207</td>
<td>University of Texas at Austin</td>
<td>10,329</td>
</tr>
<tr>
<td>University of California Berkeley</td>
<td>9,570</td>
<td>University of California Los Angeles</td>
<td>10,030</td>
</tr>
<tr>
<td>University of California Davis</td>
<td>9,289</td>
<td>University of California Berkeley</td>
<td>9,817</td>
</tr>
<tr>
<td>University of Washington Seattle</td>
<td>8,916</td>
<td>Pennsylvania State University main campus</td>
<td>9,715</td>
</tr>
<tr>
<td>Rutgers University New Brunswick</td>
<td>8,369</td>
<td>University of Illinois at Urbana Champaign</td>
<td>9,583</td>
</tr>
<tr>
<td>University of Texas at Austin</td>
<td>7,642</td>
<td>University of Michigan Ann Arbor</td>
<td>8,935</td>
</tr>
<tr>
<td>University of California Irvine</td>
<td>7,609</td>
<td>University of Washington Seattle</td>
<td>8,827</td>
</tr>
<tr>
<td>University of Florida</td>
<td>7,304</td>
<td>Ohio State University main campus</td>
<td>8,633</td>
</tr>
<tr>
<td>University of California San Diego</td>
<td>7,258</td>
<td>Texas A &amp; M University</td>
<td>8,475</td>
</tr>
<tr>
<td>University of Michigan Ann Arbor</td>
<td>7,100</td>
<td>Purdue University main campus</td>
<td>8,249</td>
</tr>
<tr>
<td>Michigan State University</td>
<td>6,792</td>
<td>Rutgers University New Brunswick</td>
<td>8,060</td>
</tr>
<tr>
<td>University of Illinois at Urbana Champaign</td>
<td>6,761</td>
<td>University of Maryland College Park</td>
<td>7,928</td>
</tr>
<tr>
<td>Texas A &amp; M University</td>
<td>6,570</td>
<td>University of Florida</td>
<td>7,916</td>
</tr>
<tr>
<td>Ohio State University main campus</td>
<td>6,543</td>
<td>University of Wisconsin Madison</td>
<td>7,965</td>
</tr>
<tr>
<td>University of California Santa Barbara</td>
<td>6,401</td>
<td>North Carolina State University at Raleigh</td>
<td>7,864</td>
</tr>
<tr>
<td>University of Wisconsin Madison</td>
<td>6,356</td>
<td>Brigham Young University</td>
<td>7,517</td>
</tr>
<tr>
<td>University of Maryland College Park</td>
<td>6,014</td>
<td>University of California Davis</td>
<td>7,395</td>
</tr>
<tr>
<td>Pennsylvania State University main campus</td>
<td>5,883</td>
<td>Michigan State University</td>
<td>7,317</td>
</tr>
<tr>
<td>University of Colorado at Boulder</td>
<td>5,841</td>
<td>Virginia Polytechnic Institute and State University</td>
<td>7,094</td>
</tr>
<tr>
<td>University of Minnesota Twin Cities</td>
<td>5,533</td>
<td>University of California Irvine</td>
<td>7,067</td>
</tr>
<tr>
<td>North Carolina State University at Raleigh</td>
<td>4,899</td>
<td>University of Minnesota Twin Cities</td>
<td>6,772</td>
</tr>
<tr>
<td>San Diego State University</td>
<td>4,839</td>
<td>University of California San Diego</td>
<td>6,751</td>
</tr>
<tr>
<td>University of South Florida</td>
<td>4,797</td>
<td>Georgia Institute of Technology main campus</td>
<td>6,478</td>
</tr>
<tr>
<td>University of Arizona</td>
<td>4,684</td>
<td>University of Colorado at Boulder</td>
<td>5,928</td>
</tr>
<tr>
<td>University of Virginia main campus</td>
<td>4,505</td>
<td>Iowa State University</td>
<td>5,531</td>
</tr>
<tr>
<td>University of California Santa Cruz</td>
<td>4,433</td>
<td>University of Arizona</td>
<td>5,144</td>
</tr>
<tr>
<td>University of North Carolina at Chapel Hill</td>
<td>4,382</td>
<td>Cornell University Endowed Colleges</td>
<td>5,144</td>
</tr>
<tr>
<td>Boston University</td>
<td>4,281</td>
<td>University of Utah</td>
<td>5,064</td>
</tr>
<tr>
<td>Purdue University main campus</td>
<td>4,270</td>
<td>University of California Santa Barbara</td>
<td>4,874</td>
</tr>
<tr>
<td>Brigham Young University</td>
<td>4,224</td>
<td>California Polytechnic State University San Luis Obispo</td>
<td>4,845</td>
</tr>
<tr>
<td>Florida State University</td>
<td>4,173</td>
<td>Arizona State University main campus</td>
<td>4,840</td>
</tr>
<tr>
<td>University of Massachusetts Amherst</td>
<td>4,135</td>
<td>San Diego State University</td>
<td>4,712</td>
</tr>
<tr>
<td>Virginia Polytechnic Institute and State University</td>
<td>3,989</td>
<td>University of Virginia main campus</td>
<td>4,521</td>
</tr>
<tr>
<td>Arizona State University main campus</td>
<td>3,947</td>
<td>Auburn University main campus</td>
<td>4,517</td>
</tr>
<tr>
<td>University of Central Florida</td>
<td>3,818</td>
<td>Florida State University</td>
<td>4,328</td>
</tr>
<tr>
<td>California State University Northridge</td>
<td>3,799</td>
<td>University of Massachusetts Amherst</td>
<td>4,296</td>
</tr>
<tr>
<td>University of Pittsburgh main campus</td>
<td>3,752</td>
<td>University of Pittsburgh main campus</td>
<td>4,220</td>
</tr>
<tr>
<td>SUNY at Binghamton</td>
<td>3,747</td>
<td>Kansas State University</td>
<td>3,997</td>
</tr>
<tr>
<td>Indiana University Bloomington</td>
<td>3,646</td>
<td>University of Tennessee</td>
<td>3,989</td>
</tr>
<tr>
<td>New York University</td>
<td>3,608</td>
<td>Oregon State University</td>
<td>3,945</td>
</tr>
<tr>
<td>University of Georgia</td>
<td>3,564</td>
<td>Louisiana State University &amp; A&amp;M College</td>
<td>3,930</td>
</tr>
<tr>
<td>Colorado State University</td>
<td>3,538</td>
<td>University of Missouri Columbia</td>
<td>3,917</td>
</tr>
<tr>
<td>University of Oregon</td>
<td>3,487</td>
<td>SUNY at Buffalo</td>
<td>3,880</td>
</tr>
<tr>
<td>Cornell University Endowed Colleges</td>
<td>3,471</td>
<td>Colorado State University</td>
<td>3,710</td>
</tr>
<tr>
<td>San Francisco State University</td>
<td>3,389</td>
<td>University of South Florida</td>
<td>3,663</td>
</tr>
<tr>
<td>Washington State University</td>
<td>3,385</td>
<td>University of Central Florida</td>
<td>3,653</td>
</tr>
<tr>
<td>California State University Long Beach</td>
<td>3,287</td>
<td>United States Naval Academy</td>
<td>3,605</td>
</tr>
<tr>
<td>University of Tennessee</td>
<td>3,284</td>
<td>University of Pennsylvania</td>
<td>3,588</td>
</tr>
<tr>
<td>Louisiana State University &amp; A&amp;M College</td>
<td>3,264</td>
<td>Indiana University Bloomington</td>
<td>3,586</td>
</tr>
<tr>
<td>University of Pennsylvania</td>
<td>3,227</td>
<td>Harvard University</td>
<td>3,532</td>
</tr>
<tr>
<td>Other institutions</td>
<td>797,118</td>
<td>Other institutions</td>
<td>735,597</td>
</tr>
</tbody>
</table>

Most utilities probably have long-standing relations with the engineering schools in their state or region. Given the impending wave of retirements in all sectors of the U.S. economy and the relatively small number of engineers graduating with bachelor’s degrees from accredited universities (65,000 annually, including about 10,000 in civil engineering), the competition for this newly minted talent will be fierce in the years ahead. Competition for graduates will come from many sources, including private engineering companies specializing in water systems, as well as state and federal agencies.
To compete successfully in the years ahead will require recruitment strategies beyond the engineering schools in Tables C-8 and C-9. Likewise, successful recruitment of plant operators will require strategies beyond high schools and community colleges.

Professional associations and affinity programs representing various constituencies offer unique, largely untapped opportunities for water utilities to recruit both plant operators and engineers. As Table C-10 shows, for example, engineers are represented by at least 13 different professional associations, including the American Society of Civil Engineers (ASCE), The American Academy of Civil Engineers, the National Society for Black Engineers, the Society of Women Engineers, and the Society of American Military Engineers—a key organization for experienced engineers transitioning out of military service. Advertising job vacancies in the publications and on the websites of these organizations will provide water utilities with access to nationally and perhaps internationally diverse pools of engineering talent.

Table C-10
Engineering Associations

<table>
<thead>
<tr>
<th>Name</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Society of Civil Engineers</td>
<td>Geo-Institute</td>
</tr>
<tr>
<td>ASCE World Headquarters</td>
<td>GI of ASCE</td>
</tr>
<tr>
<td>1801 Alexander Bell Dr.</td>
<td>1801 Alexander Bell Drive</td>
</tr>
<tr>
<td>Reston, Va. 20191-4400</td>
<td>Reston, VA 20191-4400</td>
</tr>
<tr>
<td>Toll free: 800-548 ASCE(2723)</td>
<td>800-548-2723 (Voice)</td>
</tr>
<tr>
<td>International: 703-295-6000</td>
<td>703-295-6350 (Voice)</td>
</tr>
<tr>
<td>Fax: 703-295-6222</td>
<td>703-295-6351 (Fax)</td>
</tr>
<tr>
<td><a href="http://www.asce.org">www.asce.org</a></td>
<td><a href="http://www.geoinstitute.org">www.geoinstitute.org</a></td>
</tr>
<tr>
<td>Environmental &amp; Water Resources Institute (EWRI)</td>
<td>National Society of Professional Engineers (NSPE)</td>
</tr>
<tr>
<td>EWRI of ASCE</td>
<td>NSPE Headquarters</td>
</tr>
<tr>
<td>1801 Alexander Bell Drive</td>
<td>1420 King Street</td>
</tr>
<tr>
<td>Reston, VA 20191-4400</td>
<td>Alexandria, VA 22314-2794</td>
</tr>
<tr>
<td>Tel: 703-295-6380</td>
<td>Phone: 703-684-2800</td>
</tr>
<tr>
<td>Fax: 703-295-6371</td>
<td>Fax: 703-836-4875</td>
</tr>
<tr>
<td><a href="http://www.ewrinstitute.org">www.ewrinstitute.org</a></td>
<td><a href="http://www.nspe.org">www.nspe.org</a></td>
</tr>
<tr>
<td>Coasts, Oceans, Ports, and Rivers Institute (COPRI)</td>
<td>American Academy of Environmental Engineers</td>
</tr>
<tr>
<td>An Institute of ASCE</td>
<td>130 Holiday Court, Suite 100</td>
</tr>
<tr>
<td>1801 Alexander Bell Drive</td>
<td>Annapolis, MD 21401</td>
</tr>
<tr>
<td>Reston, VA 20191-4400</td>
<td>410-266-3311, FAX: 410-266-7653</td>
</tr>
<tr>
<td><a href="http://www.coprinstitute.org">www.coprinstitute.org</a></td>
<td><a href="http://www.aaeet.net">www.aaeet.net</a></td>
</tr>
<tr>
<td>American Academy of Water Resources Engineers</td>
<td>Water Environment Federation</td>
</tr>
<tr>
<td>1801 Alexander Bell Drive</td>
<td>601 Wythe Street</td>
</tr>
<tr>
<td>Reston, VA 20191</td>
<td>Alexandria, VA, 22314-1994 USA</td>
</tr>
<tr>
<td>Phone: 703-295-6414</td>
<td>Tel. 1-800-666-0206</td>
</tr>
<tr>
<td>Fax: 703-295-6415</td>
<td>Fax. 1-703-684-2492</td>
</tr>
<tr>
<td>E-mail: <a href="mailto:certification@aawre.org">certification@aawre.org</a></td>
<td><a href="http://www.wef.org">www.wef.org</a></td>
</tr>
<tr>
<td><a href="http://www.aawre.org">www.aawre.org</a></td>
<td></td>
</tr>
</tbody>
</table>

©2008 AwwaRF. ALL RIGHTS RESERVED
In addition to professional engineering organizations, affinity programs for a range of demographic groups, including older workers, military veterans, and dislocated workers, constitute other potential worker recruitment strategic alliance partners for the water utilities industry.

Re-thinking the roles of older and retired workers and even retirement may be essential, especially for crucial positions like those filled by engineers in the water utility industry. A 2006 report by Ernst & Young⁶ and a 2005 GAO Study⁷ both underscore the need for a fresh assessment of the older worker. These and similar reports offer a road map for consideration by the utility industry.

The American Association of Retired Persons (AARP) is the most logical potential strategic alliance partner for the water utilities industry to recruit older workers. AARP boast a membership of 35 million. Demographically, almost half of the nation’s 50 and older population are members of AARP. The membership’s median age is 65 and more than half are women. Geographically, AARP has an established presence in every state, the District of Columbia, Puerto Rico, and the Virgin Islands. Moreover, about 40,000 members live outside the U.S., which means the membership includes a substantial pool of potential international recruits.

Several factors are driving older workers to work longer and thus make them a potentially viable pool of recruits for the water utilities industry. They include: the “prohibition of mandatory retirement, changes in social security, and [financial necessity due

---

⁶ The Aging U.S. Workforce: Employer Challenges and Responses. 2006 Ernst & Young LLP

to] the erosion of pension and retiree health benefits.” According to AARP, about 44 percent of its members work part-time or full-time.

To attract AARP members and other older workers, water utilities will have to substantially revise their human resource management policies. Specifically, they will have to create mechanisms that will allow them to hire older workers as consultants or temporary workers; offer part-time work with and without benefits; and provide other incentives likely to be attractive to older and retiring workers, such as retirement health benefits, prescription drug coverage, superior dental and vision plans, defined benefit pension, and long-term care insurance. In addition, as a strategy to retain older employees, water utilities should aggressively implement phased retirement programs.

Specifically to recruit plant operators, the water utility industry should forge a strategic alliance with the AARP Foundation’s Senior Community Services Employment Program (SCSEP), a worker-training program for low income persons 55 or older. According to the AARP Foundation, “Those who qualify receive paid, temporary assignments where they develop the skills, experiences, and confidence to find a permanent, unsubsidized job.” Given that plant operators receive most of their training on the job, this seems to be a potentially viable link to a pool of highly motivated older job seekers.

To recruit 50+ Hispanics, water utilities should consider advertising job vacancies for both plant operators and engineers in Segunda Juvertud, AARP’s “quarterly Spanish-English newspaper that targets the booming Hispanic community age 50+.” Water utilities should also place job vacancy ads in the AARP Magazine (published bimonthly), in the AARP Bulletin (published 11 times a year), and on the AARP website (www.aarp.org).

Displaced workers constitute yet another potential pool of recruits for the water utilities industry. Between 2003 and 2005, according to Bureau of Labor Statistics (BLS), 3.8 million “persons 20 years of age or older . . . lost or left jobs because their plant or company closed or moved [49%], there was insufficient work for them to do [22%], or their position or shift was abolished [28.8%]. All of these individuals had worked for their employer for three or more years at the time of their displacement. In part as a function of their established employment track records, however, 70% of these displaced workers were re-employed by the time they were surveyed by the Department of Labor in 2006.

Given their prior work experience, the 30% who were unemployed or not in the labor force when the 2006 survey was conducted are worthy of serious consideration for plant operator jobs in the water utilities industry. As Table C-11 shows, this pool of potential recruits is predominately white (82.8%), slightly more likely to be female (52.1%), and disproportionately between the ages of 25 and 54 (63.1%). The majority have worked in non-agricultural industries (97.4%), including 43,000 (3.7%) in transportation and utilities. Geographically, these displaced workers are concentrated primarily in the East North Central (20.7%), Middle Atlantic (15%), Pacific (14.2%), and South Atlantic (12.7%) states (see Table C-11).
Table C-11
Profiles of Displaced Workers (1), 2006

Note: See page 10 for a map showing the regions.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Total Displaced Workers</th>
<th>Percent</th>
<th>Unemployed or Not in the Labor Force</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total 20 Years and Older</td>
<td>3,815</td>
<td>100.0%</td>
<td>1,148</td>
<td>100.0%</td>
</tr>
<tr>
<td><strong>Sex:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td>2,075</td>
<td>54.4%</td>
<td>550</td>
<td>47.9%</td>
</tr>
<tr>
<td>Women</td>
<td>1,739</td>
<td>45.6%</td>
<td>598</td>
<td>52.1%</td>
</tr>
<tr>
<td><strong>Race/Ethnicity:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>3,169</td>
<td>83.1%</td>
<td>951</td>
<td>82.8%</td>
</tr>
<tr>
<td>Black or African American</td>
<td>452</td>
<td>11.8%</td>
<td>130</td>
<td>11.3%</td>
</tr>
<tr>
<td>Asian</td>
<td>113</td>
<td>3.0%</td>
<td>132</td>
<td>2.8%</td>
</tr>
<tr>
<td>Hispanic or Latino Ethnicity</td>
<td>418</td>
<td>10.9%</td>
<td>163</td>
<td>14.1%</td>
</tr>
<tr>
<td><strong>Age:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20 to 24 Years</td>
<td>111</td>
<td>2.9%</td>
<td>37</td>
<td>3.2%</td>
</tr>
<tr>
<td>25 to 54 Years</td>
<td>2,341</td>
<td>74.5%</td>
<td>724</td>
<td>63.1%</td>
</tr>
<tr>
<td>55 to 64 Years</td>
<td>728</td>
<td>19.1%</td>
<td>287</td>
<td>25.0%</td>
</tr>
<tr>
<td>65 Years and Over</td>
<td>135</td>
<td>3.5%</td>
<td>101</td>
<td>8.8%</td>
</tr>
<tr>
<td><strong>Industry:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agriculture and Related Industries</td>
<td>14</td>
<td>0.4%</td>
<td>-</td>
<td>N/A</td>
</tr>
<tr>
<td>Wage and Salary Workers</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Agriculture Industries Wage and Salary Workers</td>
<td>3,753</td>
<td>98.4%</td>
<td>1,118</td>
<td>97.4%</td>
</tr>
<tr>
<td>Transportation and Utilities</td>
<td>189</td>
<td>5.0%</td>
<td>43</td>
<td>3.7%</td>
</tr>
<tr>
<td>Government Workers</td>
<td>202</td>
<td>5.3%</td>
<td>58</td>
<td>5.3%</td>
</tr>
<tr>
<td><strong>Region:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>New England</td>
<td>237</td>
<td>6.2%</td>
<td>78</td>
<td>6.6%</td>
</tr>
<tr>
<td>Middle Atlantic</td>
<td>431</td>
<td>11.3%</td>
<td>173</td>
<td>16.0%</td>
</tr>
<tr>
<td>East North Central</td>
<td>736</td>
<td>19.3%</td>
<td>238</td>
<td>20.7%</td>
</tr>
<tr>
<td>West North Central</td>
<td>236</td>
<td>6.9%</td>
<td>75</td>
<td>6.6%</td>
</tr>
<tr>
<td>South Atlantic</td>
<td>350</td>
<td>9.2%</td>
<td>146</td>
<td>12.7%</td>
</tr>
<tr>
<td>East South Central</td>
<td>263</td>
<td>9.3%</td>
<td>100</td>
<td>8.7%</td>
</tr>
<tr>
<td>West South Central</td>
<td>352</td>
<td>9.2%</td>
<td>102</td>
<td>8.9%</td>
</tr>
<tr>
<td>Mountain</td>
<td>248</td>
<td>6.5%</td>
<td>73</td>
<td>6.4%</td>
</tr>
<tr>
<td>Pacific</td>
<td>627</td>
<td>16.4%</td>
<td>163</td>
<td>14.2%</td>
</tr>
</tbody>
</table>

Numbers in Thousands

(1) Data refer to persons who had 3 or more years of tenure on a job they had lost or left between January 2003 and December 2005 because of plant or company closings or moves, insufficient work, or the abandonment of their positions or shifts.

Note: Estimates for the above groups (white, Black or African American, and Asian) do not sum to totals because data are not presented for all races. In addition, persons whose ethnicity is identified as Hispanic or Latino may be of any race and, therefore, are classified by ethnicity as well as by race.

Source: U.S. Department of Labor’s Bureau of Labor Statistics, Table 1. Displaced Workers (1) by Age, Sex, Race, Hispanic or Latino Ethnicity, and Employment Status in January 2006, Table 4. Displaced Workers (1) by Industry and Class of Worker of Lost Job and Employment Status in January 2006, Table 6. Displaced Workers (1) by Selected Characteristics and Area of Residence in January 2006, September 15, 2006
The water industry can gain first mover advantage in recruiting displaced workers by monitoring such plant closings databases as Demolition X (www.demolitionx.com), plant closings news (www.plantclosings.com), and Industrial Information Resources, Inc. (www.Industrialinfo.com), as well as the BLS plant closings and mass layoffs database.

Individuals transitioning out of the military constitute yet another potentially important pool of talent for plant operator positions in the water utilities industry. They are an attractive pool in any location, but especially in areas near large military bases.

As Table C-12 shows, there are 24.8 million veterans in the U.S. More than one-third (36% or 8.8 million) are between the ages of 25 and 54. One quarter (6.1 million) are 55 to 64 years old. This substantial talent pool is concentrated in the South Atlantic (21.3% or 5.2 million), East South Central (15.4% or 3.8 million), Middle Atlantic (11.7% or 2.9 million) and West South Central (10.8% or 2.7 million) states.

Table C-12
Profiles of Veterans, 2000-2033

Note: See page 10 for a map showing the regions.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Total Displaced Workers</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total 20 Years and Over Veterans</td>
<td>24,793,336</td>
<td>100.0%</td>
</tr>
<tr>
<td>Sex:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td>23,100,938</td>
<td>93.2%</td>
</tr>
<tr>
<td>Women</td>
<td>1,692,398</td>
<td>6.8%</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less Than 20 Years</td>
<td>13,619</td>
<td>0.1%</td>
</tr>
<tr>
<td>20 to 24 Years</td>
<td>315,917</td>
<td>1.3%</td>
</tr>
<tr>
<td>25 to 54 Years</td>
<td>8,818,940</td>
<td>36.6%</td>
</tr>
<tr>
<td>55 to 64 Years</td>
<td>6,124,766</td>
<td>24.7%</td>
</tr>
<tr>
<td>65 Years and Over</td>
<td>9,520,094</td>
<td>38.4%</td>
</tr>
<tr>
<td>Region</td>
<td></td>
<td></td>
</tr>
<tr>
<td>New England</td>
<td>1,183,620</td>
<td>4.8%</td>
</tr>
<tr>
<td>Middle Atlantic</td>
<td>2,900,737</td>
<td>11.7%</td>
</tr>
<tr>
<td>East North Central</td>
<td>3,810,738</td>
<td>15.4%</td>
</tr>
<tr>
<td>West: North Central</td>
<td>1,781,702</td>
<td>7.2%</td>
</tr>
<tr>
<td>South Atlantic</td>
<td>5,272,899</td>
<td>21.3%</td>
</tr>
<tr>
<td>East South Central</td>
<td>1,567,053</td>
<td>6.3%</td>
</tr>
<tr>
<td>West: South Central</td>
<td>2,672,370</td>
<td>10.8%</td>
</tr>
<tr>
<td>Mountain</td>
<td>1,848,926</td>
<td>7.5%</td>
</tr>
<tr>
<td>Pacific</td>
<td>3,485,285</td>
<td>14.1%</td>
</tr>
</tbody>
</table>

Numbers in Thousands

To recruit from this pool, water utilities must become actively involved in job fairs for military personnel moving back into civilian life (e.g. www.civilianjobs.com/ and www.lucasgroup.com/military/) and forge strategic alliances with the more than twenty veterans organizations that exist in the United States (see Table C-13).
# Table C-13

## Veterans Associations

<table>
<thead>
<tr>
<th>Name</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Ex-Prisoners of War</td>
<td>National Coalition for Homeless Veterans</td>
</tr>
<tr>
<td>National Headquarters</td>
<td>National Headquarters</td>
</tr>
<tr>
<td>3201 East Pioneer Parkway #40</td>
<td>333 ½ Pennsylvania Avenue, SE</td>
</tr>
<tr>
<td>Arlington, Texas 76010-5396</td>
<td>Washington, DC 20003-1148</td>
</tr>
<tr>
<td>817-649-2979</td>
<td>E-mail: <a href="mailto:nchv@nchv.org">nchv@nchv.org</a></td>
</tr>
<tr>
<td>817-649-0109 - FAX</td>
<td>Toll Free: 800.VET.HELP</td>
</tr>
<tr>
<td><a href="mailto:hq@axpow.org">hq@axpow.org</a></td>
<td>Fax: 202.546.2063</td>
</tr>
<tr>
<td><a href="http://www.axpow.org">www.axpow.org</a></td>
<td><a href="http://www.nchv.org">www.nchv.org</a></td>
</tr>
<tr>
<td>American Legion</td>
<td>United Service Organizations, Inc. - USO</td>
</tr>
<tr>
<td>National Headquarters Indianapolis Office</td>
<td>World Headquarters</td>
</tr>
<tr>
<td>700 North Pennsylvania St.</td>
<td>2111 Wilson Blvd.</td>
</tr>
<tr>
<td>P.O. Box 1055</td>
<td>Suite 1200</td>
</tr>
<tr>
<td>Indianapolis, IN 46206</td>
<td>Arlington, VA 22201</td>
</tr>
<tr>
<td>Telephone: 317/630-1200</td>
<td>703-908-6400 main</td>
</tr>
<tr>
<td>Fax: 317/630-1223</td>
<td>703-908-6402 fax</td>
</tr>
<tr>
<td><a href="http://www.legion.org">www.legion.org</a></td>
<td><a href="http://www.uso.org">www.uso.org</a></td>
</tr>
<tr>
<td>MILITARY ORDER OF THE PURPLE HEART</td>
<td>DISABLED AMERICAN VETERANS NATIONAL HEADQUARTERS</td>
</tr>
<tr>
<td>5413-B Backlick Road</td>
<td>3725 Alexandria Pike</td>
</tr>
<tr>
<td>Springfield, VA 22151-3915</td>
<td>Cold Spring, KY 41076</td>
</tr>
<tr>
<td>Phone: 703-642-5360</td>
<td>877-I Am A Vet (877-426-2838)</td>
</tr>
<tr>
<td>Fax: 703-642-1842</td>
<td>(859) 441-7300</td>
</tr>
<tr>
<td>Toll-Free: 888-668-1656</td>
<td><a href="http://www.dav.org">www.dav.org</a></td>
</tr>
<tr>
<td><a href="http://www.purpleheart.org">www.purpleheart.org</a></td>
<td></td>
</tr>
<tr>
<td>AMVETS</td>
<td>Iraq and Afghanistan Veterans of America or IAVA (formerly OpTruth)</td>
</tr>
<tr>
<td>4647 Forbes Boulevard</td>
<td>770 Broadway, 2nd Floor</td>
</tr>
<tr>
<td>Lanham, MD 20706-4380</td>
<td>New York, NY 10003</td>
</tr>
<tr>
<td>Phone: (301) 459-9600</td>
<td>P: 212-982-9699</td>
</tr>
<tr>
<td>Toll-Free: 1-877-726-8387</td>
<td>F: 212-982-8645</td>
</tr>
<tr>
<td>Fax: (301) 459-792</td>
<td><a href="http://www.iava.org">www.iava.org</a></td>
</tr>
<tr>
<td><a href="http://www.amvets.org">www.amvets.org</a></td>
<td>Veterans for America</td>
</tr>
<tr>
<td>Vietnam Veterans of America</td>
<td>1025 Vermont Ave NW, 7th Floor</td>
</tr>
<tr>
<td>8605 Cameron Street</td>
<td>Washington, DC 20005</td>
</tr>
<tr>
<td>Silver Spring, MD 2091</td>
<td>Phone: 202-483-9222</td>
</tr>
<tr>
<td>1-800-vva-1316</td>
<td>Fax: 202-483-9312</td>
</tr>
<tr>
<td><a href="http://www.vva.org">www.vva.org</a></td>
<td><a href="http://www.veteransforamerica.org">www.veteransforamerica.org</a></td>
</tr>
<tr>
<td>Veterans of Foreign Wars</td>
<td>Veterans For Peace</td>
</tr>
<tr>
<td>VFW Memorial Building</td>
<td>216 South Meramec Ave</td>
</tr>
<tr>
<td>200 Maryland Avenue, N.E.,</td>
<td>St. Louis MO 63105</td>
</tr>
<tr>
<td>Washington, D.C. 20002</td>
<td>VOICE (314) 725-6005</td>
</tr>
<tr>
<td>Phone: 202 543-2239</td>
<td>FAX (314) 725-7103</td>
</tr>
<tr>
<td>Fax: 202 547-3196</td>
<td><a href="http://www.veteransforpeace.org">www.veteransforpeace.org</a></td>
</tr>
<tr>
<td>E-Mail: <a href="mailto:vfw@vfw.org">vfw@vfw.org</a></td>
<td></td>
</tr>
<tr>
<td><a href="http://www.vfw.org">www.vfw.org</a></td>
<td></td>
</tr>
</tbody>
</table>

## Summary

The American workforce faces the significant challenge of replacing many workers in the near future due to the impending wave of retirements. Like the work force in the country, the work force in the water utility industry is aging. Pro-active focus on succession strategies for this crucial workforce requires understanding of the pools of potential...
replacements. We assess the pools for two vital but very different positions within the industry: engineers and plant operators. The education, career tracks, and pay levels of these two positions differ considerably, so most aspects of the potential employee pools also differ.

In this report, we have identified four potential sources or pools of replacement workers for retiring water industry workers. High school graduates, who have successfully completed the non-college bound vocational education and general education course of study tracks, and community college graduates, who have earned associate’s degrees in engineering, are ideal candidates for plant operator jobs. Four year colleges and universities with accredited bachelor’s degree programs in engineering remain the primary source of engineering talent.

But, owing to fierce competition for this talent from other public sector and private sector firms, recruitment through these venues will not be sufficient. To meet its workforce needs of the future, the water utility industry will have to recruit through various engineering professional associations and through affinity programs that represent a range of demographic groups, including older workers, displaced workers, and military veterans. Aggressive recruitment through these entities will likely provide the water utility industry with access to a national and perhaps even international pool of talent to fill both plant operator and engineering posts.
Recruitment, Training and Retention
Outside the Water Industry

July 2007

Prepared by Employers Association

Jeffrey Cookson, MFA, SPHR
Diane Hinds, Ed. D.
Lisa Stock, MSW, SPHR

This report is provided to EMA in response to the AWWARF grant awarded to EMA to provide information regarding recruitment, training, and retention. Any or all of this report may be used by EMA as part of their work on this AWWARF grant. Use, reproducing and/or distribution of any or all of this report for other purposes is prohibited without written permission from Employers Association, Inc.
## CONTENTS

### INTRODUCTION

<table>
<thead>
<tr>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>159</td>
</tr>
</tbody>
</table>

### RECRUITMENT

| Definition | 159 |
| Statement of the Problem | 159 |
| Recruiting Methods | 161 |
| Internal Recruiting | 161 |
| Employee Referrals | 163 |
| Compensation | 163 |
| Advertising | 163 |
| Web-Based Recruitment | 164 |
| Agencies and Search Firms | 165 |
| Building Relationships with Schools | 166 |
| Targeted Recruitment to Specialized Groups | 168 |
| Reducing the Need to Recruit | 168 |
| Responding to Changing Demographics and Trends | 169 |
| Selection | 175 |

### TRAINING

| Definition | 176 |
| Statement of Problem | 176 |
| Training Needs Assessment | 177 |
| Creating a Learning Environment | 177 |
| Training Delivery Methods | 178 |
| Measurement of Training Effectiveness | 180 |
| Responding to Changing Demographics/Trends | 181 |

### RETENTION

| Definition | 183 |
| Statement of Problem | 183 |
| Strategies and Practices | 183 |
| Compensation | 185 |
| Challenging Work | 185 |
| Opportunities to Learn and Grow | 186 |
| Work Relationships | 187 |
| Recognition | 188 |
| Work/Life Balance | 189 |
| Culture as a Retention Factor | 189 |
| Responding to Changing Demographics/Trends | 191 |

### SUMMARY

| Keys for Successful Recruitment | 193 |
| Keys for Successful Training | 194 |
| Keys for Successful Retention | 194 |
| References |  |
INTRODUCTION

Finding qualified candidates, training them, and retaining them are significant challenges for today’s employers. The water industry, like many others, will be losing many long term employees due to retirements, and must replace them by hiring talent from a much smaller pool of available applicants. Examining experiences from employers in other industries may provide useful information for the water industry as it plans to address the increasing challenges related to recruiting, training, and retaining qualified employees.

Following this introduction, this report is divided into four major sections,

1. Recruitment
2. Training
3. Retention
4. Summary

The first three sections provide definitions of the activities being reviewed, a discussion of the specific issues and concerns related to that topic and general and specific examples of practices of employers related to the subject.

RECRUITMENT

Definitions

Recruitment is defined as any practice or activity carried on by the organization with the primary purpose of identifying and attracting potential employees.

Selection refers to the process of determining which applicants will be chosen by the employer to receive employment offers. Although selection practices are beyond the specific scope of this report, we have included some information regarding selection methods because they are interrelated to recruitment, training, and retention.

Statement of the Problem

Several factors are reducing the pool of available, qualified applicants. The demographic shift caused by a lower birth rate in the seventies and eighties, has reduced the number of new entrants to the workforce. The declining skill level of high school graduates means that many who are seeking entry level positions do not have the basic skills in math and communication to be qualified for available jobs.

Some studies report that up to 90 percent of the available applicants are qualified for only 10% of available jobs and that 90% of available jobs require the skills of a selective 10% of the available job applicants. Thus there is significant mismatch between the needs of the employment market and those seeking employment. Given this shortage of qualified applicants, it will continue to be more difficult for employers to find candidates to fill higher level, more technical positions. In the water industry and others, that means that there will be fewer candidates for positions such as engineers, scientists, process operators, and higher skilled maintenance workers.
Respondents to a recent survey conducted by Employers Association (EA) indicated that most employers (72%) report having some, or great difficulty finding qualified applicants. The majority are having difficulty finding qualified engineers, scientists, and process operators and getting them to accept employment.

<table>
<thead>
<tr>
<th>Question</th>
<th>No Difficulty</th>
<th>Some Difficulty</th>
<th>Great Difficulty</th>
</tr>
</thead>
<tbody>
<tr>
<td>How much difficulty do you have in finding qualified applicants? (all positions)</td>
<td>28%</td>
<td>56%</td>
<td>19%</td>
</tr>
<tr>
<td>How much difficulty do you have in finding qualified Engineers?</td>
<td>9%</td>
<td>61%</td>
<td>30%</td>
</tr>
<tr>
<td>How much difficulty do you have in getting qualified Engineers to accept employment?</td>
<td>32%</td>
<td>60%</td>
<td>8%</td>
</tr>
<tr>
<td>How much difficulty do you have in finding qualified Scientists?</td>
<td>12%</td>
<td>62%</td>
<td>26%</td>
</tr>
<tr>
<td>How much difficulty do you have in getting qualified Scientists to accept employment?</td>
<td>44%</td>
<td>44%</td>
<td>12%</td>
</tr>
<tr>
<td>How much difficulty do you have in finding qualified Process Operators?</td>
<td>10%</td>
<td>80%</td>
<td>10%</td>
</tr>
<tr>
<td>How much difficulty do you have in getting qualified Process Operators to accept employment?</td>
<td>45%</td>
<td>50%</td>
<td>5%</td>
</tr>
</tbody>
</table>

Source: EA Recruitment and Retention Survey, 2007

The time between when the position comes open until someone is hired for the position varies by position.

<table>
<thead>
<tr>
<th>Positions</th>
<th>Average Number of Days to Fill</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Positions</td>
<td>50</td>
</tr>
<tr>
<td>Engineers</td>
<td>77</td>
</tr>
<tr>
<td>Scientist</td>
<td>79</td>
</tr>
<tr>
<td>Process Operators</td>
<td>40</td>
</tr>
</tbody>
</table>

Source: EA Recruitment and Retention Survey, 2007

Recruiting Methods

Internal Recruiting

One source of applicants for positions above entry level is current employees. Internal posting of available positions is a standard practice in many organizations across industries. Internally posting positions and promoting or reassigning current employees can be an effective retention strategy, and should not be overlooked as a recruitment method to consider when positions become available.

Succession planning is an effective method to maximize an organization’s ability to fill positions internally. It is an organized method of identifying, evaluating, and developing individuals to fill future available positions. Usually, succession planning is used for...
management and executive level positions, but it can be used for any key positions within an organization. The steps of an effective succession plan are:

- Leadership and other key individuals first hypothesize about issues the organization is likely to face in the future. Since succession planning deals with filling positions that won’t be vacant until the future, it is important that decision makers understand that the needs of the organization may be different in the future because of increasingly frequent changes in business practices, demographics and the local, national and worldwide environments.
- Determine which positions are to be included in the program. Succession planning requires resources and these resources must be committed where they will have the greatest positive impact.
- Define future key competencies for these positions. Thinking about filling positions as they exist today will not prepare the organization to meet the challenges it will undoubtedly face in the future.
- Identify potential candidates for key positions.
- Assess their current skills.
- Identify the gap between their current skills and the skills necessary for higher level positions.
- Identify specific learning/development activities that will prepare identified successors for their future roles.
- Prepare and follow individual development plans for successors.
- Transition selected individuals to key positions when these positions open.
- Evaluate the results from the succession planning program and modify as appropriate.

Succession planning is a proactive approach to filling positions that helps ensure employees will be ready to assume positions of greater responsibility when these positions are available. It can also help prevent premature promotions because the employee’s readiness level to assume greater responsibility has been assessed, rather than assumed. Succession planning ensures continuity of leadership and serves as an effective retention strategy.

Another emerging strategy in recruitment is for organizations to consider “alumni” employees as potential applicants. Using such a strategy involves tracking former employees after they leave the organization, keeping in touch with them and when appropriate, offering incentives to return. Obviously, this strategy will only apply for individuals who had established positive work records and whose talents are valuable for the employer.

One example of successful internal recruiting efforts is an engineering firm that was frustrated by its inability to attract qualified engineers. It decided to look internally to find individuals who performed other jobs but were interested in pursuing engineering as a career. They offered an Introduction To Engineering Program for any employee interested in an engineering career. Employees who had established positive work records and expressed an interest in becoming engineers went through an assessment process to identify individuals likely to be successful as engineers. Those accepted into the program were provided tuition
reimbursement to pursue engineering degrees. The company realized that this program required a long term commitment, but felt it was worth the investment. The program resulted in providing high performing employees opportunities for advancement and growth. The company also benefited from filling engineering positions with people who already understood the company products and operations.

Another example of an organization that has been successful in internal recruitment is McDonalds. Many employees start at McDonalds in entry level, low wage positions. McDonalds actively encourages its employees to consider pursuing a career and several employees have moved up through the ranks of management, and some have become franchise owners (Noe, Hollenbeck, Gerhart, & Wright, 2006).

The Whirlpool Corporation provided another example of effective internal recruiting. Whirlpool had an antiquated system for posting available positions until 2003 when they switched to a web based system. This system allows managers to list open positions and employees to submit their resumes, using a standardized format. This allowed matches between the available positions and employees’ qualifications and interest. Whirlpool was able to staff 50% of its positions, resulting in over a $1 million savings in reduced recruiting expenses. The system also helped employees understand some available career paths and resulted in a high degree of satisfaction among employees. The turnover rate dropped from 10 – 15% before this system to less than 5% (Noe et al., 2006).

The retail industry is recognized as providing opportunities for internal candidates and filling higher level positions from within their organizations. Wal-Mart, Home Depot, and Target are examples of retailers who follow these practices. Part of what attracts applicants to retail is the opportunity for quick advancement. For example, recent college graduates hired at Target move through a training program quickly and have responsibility for a team of 20 workers and manage a multi-million dollar budget within a few months of starting employment. Some become store managers in as little as six years.

**Employee Referrals**

Employees are in a unique position to understand the organization’s culture and as such, may be able to recognize others who would be a good fit for the organization. Usually, employees are careful to refer only individuals they believe will be successful. A 2006 survey by Employers Association showed that 73% of employers found employee referrals were an effective recruiting strategy. Employee referral was rated as highest when asked to rate the ability to actually hire an applicant and was also rated as a very cost effective method of recruiting. A 2007 EA survey showed that 33% of employers seeking to fill any position, and 37% of employers seeking to fill engineering positions, found employee referrals as one of the most effective methods of finding qualified applicants.

Many organizations provide incentives to employees to refer individuals for available positions. This practice rewards employees who refer individuals who have the skills and experience needed by the employer by giving them payments or gifts when the person they refer is hired. The type of gift or amount of incentive provided to employees for referrals varies greatly. A common practice is to pay a portion of the payment when the new employee starts and pay a larger amount after three, six, or twelve months, if the referred employee is still employed.
**Compensation**

Another strategy that some employers use to enhance their ability to attract new workers is to pay above market salaries, usually referred to as taking a “lead-the-market” compensation position. Data regarding current pay rates and practices are available through several different sources. Well done compensation surveys can inform an organization what other employers are paying for a variety of positions.

In addition to base wages, some employers offer incentive pay based on performance or include company stock as part of the pay package. Incentive pay may be an inducement to accept employment, if the employee feels that the goal set for a bonus is realistic and attainable. If applicants perceive that the goal would be difficult or impossible to reach, the fact that part of their potential pay would be tied to something seen as unachievable is a disincentive.

Recent, very public debacles involving stock incentives have soured many organizations on this strategy. In some of these cases, company stock was a significant part of pay. When the stock plummeted, many employees were left with little or nothing from the stock. Such stories have diminished the value of company stock in many applicants’ eyes. Most applicants are interested in more diversified options for investments, such as those offered through a 401(k) or 403(b) and they also want more control over their investments.

**Advertising**

Many employers still rely on placing ads in local newspapers as their primary means of recruiting applicants. Slightly more than a third of the respondents in EA’s Recruitment and Retention 2007 survey who hire engineers indicated that newspaper advertising was an effective method of recruiting. When advertising in the newspaper, it is important to make the ad stand out from all the other, small print, boring language ads that make up the columns of job listings. Catchy titles, graphics, and placement in the top of a column can all help ads be noticed. However, all of these options add to the cost.

A cheaper alternative that some employers have found effective is to advertise in local community or neighborhood publications. These papers are targeted to a much narrower market, but those who look at ads in these publications are generally looking for work in that specific locale and their cost for running ads is much less.

Another strategy used by some to attract applicants is called, “Image Advertising.” The intent of such advertising is to present the organization in a positive light, thus building the impression of the organization as a good place to work. Frequently these ads contain references to progressive employment practices or display happy employees engaged in their jobs. Sometimes referred to as “passive” advertising, such ads appear on billboards, buses, baseball side boards, and any other places where people gather. These ads obviously can’t list current openings, but subtly remind the public, which includes potential applicants, of the existence of the organization and may make the organization’s name more familiar and help create a general positive image of the employer. They describe the organization in terms that are attractive to the segment of society from which the organization wants to recruit. Research shows that the image portrayed influences applicants’ opinion as to whether or not they see that organization as a fit. For example, ads for The Gap display an image of fun and
fast paced activity to attract customers. These same ads also create this image in the minds of applicants before they even seek a position with The Gap.

Although the water industry does not have the same type of work or the number of opportunities for advancement as the fast food or retail industries, understanding the power of advancement opportunities as a way to attract new employees can help when trying to develop effective recruiting strategies. An examination of the various positions within the industry and how to develop employees who start at lower levels to take on greater responsibilities can result in a win-win for both employees and the water industry employer.

**Web Based Recruitment**

Although many organizations still use traditional newspaper ads, many employers are converting to electronic recruiting as their preferred method. The use of the web as a recruiting source has grown significantly in the last 6 – 7 years. A survey in 2001 showed that HR executives evaluated electronic job boards as the most effective source of recruits (36%). Even that long ago, this survey showed that electronic recruiting was seen as more valuable than newspaper ads (36% compared to 21% for newspapers). Initially, it was mostly large organizations who used the web for recruiting. In 2003, a study of Fortune 1000 employers showed that the percentage using electronic recruiting was about 89% (Piotrowski and Armstrong, 2006). A survey by EA in 2006 indicated that more than 50% of employers of all sizes, even those with fewer than 100 employees were effectively using electronic recruiting methods.

Web based recruiting includes using the organization’s website or using an internet based job board. One of the easiest ways to advertise electronically is to list job openings on the organization’s web site. Many organizations include short questionnaires that help assess the applicants’ interests and qualifications, which can expedite the recruiting and selection process. Some include more in depth assessments of the person’s knowledge and skills to determine their fit for available positions.

Another method of electronic recruiting is posting available positions on electronic job boards, such as Monster.com, HotJobs.com, or CareerBuilder.com. The fees for listing positions varies from free to $2000+, depending on the specific board, position, length of time the listing is posted and other factors. The Internet Business Network publishes an annual report that provides information about internet recruitment sites, including pricing. (www.interbiznet.com).

These boards allow applicants to submit resumes in a standardized format that can be quickly reviewed by an interested employer. Likewise, employers can post open positions that can be reviewed by anyone visiting the site. The ultimate goal for both applicants and employers is to find a match between available positions and qualified candidates. These large sites contain numerous entries, which is both their advantage and disadvantage. On the plus side, they provide employers access to a vast number of applicants and inform applicants about numerous jobs that are available. However, the sheer number of entries to review, for both the employer and the applicant, can be overwhelming, and can seem like looking for the proverbial needle in the haystack.

There are other internet sites that specialize in specific industries, professions, or geographic regions. These sites generally have fewer entries and are more focused on a narrower group of jobs. In the 2007 EA Recruitment and Retention survey, 69% of
employers who employ engineers indicated that using internet job sites was one of their most effective recruiting methods.

Use of video is also an electronic recruiting method. Some employers include videos about the company and virtual tours of their facilities on their web site to attract applicants. Some send such videos to colleges, universities, and trade schools to lure interested students.

The use of videoconferencing allows for an initial meeting between an applicant and employers without the cost of travel to conduct interviews, but does require that both the applicant and the interviewer have access to videoconferencing equipment. This equipment can be rented and is available for use in some communities through schools or educational resources.

Agencies and Search Firms

There are public and private organizations that provide assistance finding and recruiting applicants. Using government sponsored employment services can help ensure that your opening is shared with a wide variety of applicants from diverse populations. Private search firms charge fees for their services, but can be cost effective recruiting sources, particularly for professional and managerial level positions. In EA’s 2007 Recruitment and Retention survey, 46% of respondents who were seeking to hire engineers named private employment agencies and search firms as one of their most effective recruiting sources. In a 2006 EA survey, approximately 70% of employers indicated that search firms were effective recruiting sources for executive and managerial positions.

Building Relationships with Schools

Another method of recruiting applicants is to work with colleges, universities and other post-secondary educational institutions. Employers can use this as a source for part time employees while the student is in school and also as a source for new graduates to fill full time positions. Most post-secondary education institutions have placement offices that arrange for employers to meet with students for preliminary interviews.

Many organizations find developing relationship with schools as a particularly effective method for recruiting applicants in specialty areas such as accounting, engineering, and science. In response to a need to find engineers and scientists, 3M developed an effective college recruiting strategy. They recruit at only 25 to 30 colleges and universities so that they can focus their attention on a limited number of schools and build strong, positive relationships with them. They use line managers to interview with students because these managers can share real work experiences with students and when asking students, they found that line managers have greater credibility than human resources recruiters. Although applicants don’t make their decision regarding accepting employment offers solely on their impression of the recruiter, the behavior of the recruiter does have an impact (Noe et al., 2006). Applicants expect the recruiter to provide timely feedback. Delays in getting back to students regarding their status or the next steps in the process are perceived very negatively. In order to continue to improve their recruitment process, 3M requests feedback from students regarding 3M’s processes and those used by other employers.

The EA 2007 Recruitment and Retention survey showed more employers who report they have no difficulty retaining engineers evaluate colleges, universities, and trade schools

©2008 AwwaRF. ALL RIGHTS RESERVED
as one of their top recruiting sources at a higher rate than those that report some difficulty with retaining engineers. The difference between these two groups is statistically significant.

Colleges, universities, and/or trade schools as effective recruiting source:

- No difficulty retaining: 32%
- Some difficulty retaining: 21%

Several segments of the manufacturing industry have had difficulty finding adequate qualified staff. Manufacturing as an industry suffers from “social bias” in that many students, teachers, and parents perceive manufacturing as offering low skilled, dead-end positions. In a recent survey, 60% of manufacturers indicated that they had positions available that offered growth and development, but that they were unfilled at least in part due to the perception of manufacturing as being undesirable work (Rovito, 2006). To attract potential employees, manufacturing companies sought applicants from some non-traditional sources including foreign students who have work visas. In addition, a group of manufacturing firms collaborated to educate high school students about the opportunities in manufacturing. They are exposing students to modern manufacturing facilities that are quite a contrast to the dirty, sweatshop image many had of manufacturing. They are helping students understand the variety of challenging and technical positions offered by modern manufacturers. Billboards and TV ads targeted for the high school age audience have introduced the concept of manufacturing as a place to build a successful career that pays good wages. Government sponsored workforce grants have been created to support collaboration between many segments of the manufacturing industry and technical colleges.

Another industry that had to overcome a somewhat negative image among potential applicants was printing. Printing companies experienced difficulty attracting applicants for many positions. Many people equated printing with dirty, messy work in unpleasant environments and were unaware that most printing companies had moved into the world of high tech where much of the work is done through computers. Initially, printing companies partnered with technical colleges to create training programs that would prepare students for positions in the printing industry. That initiative didn’t get the desired results, so an association of printing companies worked with high school counselors and teachers to educate them regarding the true nature of printing positions – that many of them require high tech, computer based skills, and others provide opportunities for creativity and design. They hoped to entice high school students to enroll in the training programs they had created in conjunction with the technical colleges. However, they did not see much increase in enrollment. In an attempt to change attitudes of parents, students and teachers at an even earlier stage, before career choices were being made, the professional printing association partnered with middle schools to provide information about the printing industry to students who were assigned “career booklets” or other similar assignments that require students to investigate the requirement of jobs that they might want to pursue. This early investigation of various careers can help them be prepared to plan their high school studies to move them in the right direction. By providing written material about printing industry positions, and having speakers present the images of modern printing on career days, the printing industry is exposing a young audience, and their parents and teachers, to the opportunities in printing.

Many organizations have found that an effective method of enhancing recruiting through colleges and universities is to establish internship programs. Schools are looking for
ways to give their students experiences that will help prepare them for the real world of work. Internships are such an opportunity. Not only does an internship give the organization the opportunity to assess the individual doing the internship for regular employment after graduation, but the school can be favorably disposed to the organization for providing this valuable learning experience for the students. It helps cement the relationship between the school and the employer. It can result in referrals of highly talented students from the school and its faculty.

**Targeted Recruiting to Specialized Groups**

Some organizations have found it effective to focus recruiting efforts on specific pools of applicants, such as individuals finishing military service, individuals with disabilities, or retirees seeking new opportunities. The military provides a wide variety of training while someone is in the service and many in the military have also learned sound work performance habits, such as punctuality, and a positive work ethic. There are veterans’ organizations in most cities that work with those leaving the military and can serve as a conduit between employers seeking applicants and veterans seeking employment. Likewise, there are numerous organizations that seek to help individuals with disabilities find appropriate employment opportunities. Local and national organizations that serve the needs of older adults can also prove to be good recruiting resources. Many public employees and some in private industry are eligible to retire at a relatively early age and many of these are seeking new opportunities where they can bring their skills to a new challenge.

**Reducing the Need to Recruit**

In addition to improving recruiting techniques, many industries and organizations are exploring ways to reduce their need to recruit. One approach is to improve retention, thus reducing the number of positions that need to be filled because of a voluntary termination. This topic will be discussed in a later section of this paper.

Another approach has been to apply lean principles to processes to reduce waste and improve productivity (Rovito, 2006). Quality initiatives seek to find better ways of producing work in a more efficient and effective manner that reduces the amount of workers required to produce a certain quantity of output. Some estimates speculate that almost any organization can improve its efficiency by at least 30% by simply reviewing, refining, and reengineering their processes.

The concept of “lean” is frequently associated with manufacturing processes; however quality professionals have developed methods to adopt a lean philosophy in other segments of business such as customer service and administration. The principle is the same regardless of where lean is applied. Examine work flow and systems. Identify ways to reduce waste and errors and increase efficiency.

Many employers looking for IT (information technology) professionals are experiencing difficulty finding qualified employees, and when they do, they have difficulty keeping them (Carroll, 2007). An approach some companies are using is to reduce the number of full time, regular employees in IT is to create positions that are part time, or intermittent, or to rely on contract workers who can be called upon as workload demands. Seeking candidates for part time, intermittent or contract work, expands the audience of
potential recruits. A modification of this approach includes offering employees the opportunity to split their work between IT and a “user” department where they can bring their technology skills to bear in practical application. This also helps create a better understanding of users’ needs.

Responding to Changing Demographics and Trends

Employers must ready themselves to respond to the changing demographics and adapt their recruiting methods accordingly. As the largest generation of workers in American history begins to exit due to retirement, organizations are faced with the challenge of finding replacements. We know that applicant pools will be more diverse in terms of ethnic identity, county of origin, and culture. In addition, studies have shown that each generation generally has its own preferences and expectations. Therefore, the practices that have been effective recruit the age groups identified as Traditionalists and Baby Boomers can’t be expected to be as effective with the generations that follow them. In addition, women are continuing to enter professions that were once filled almost exclusively by men. For example, Traditionalist and Boomers are less likely to surf the net to find information about employment opportunities than are the Generation X and Y (or Millennial) aged individuals. These younger individuals would be more comfortable responding to electronic ads, accessing website to learn about the organization, and submitting their resume online.

Recognizing that “one size does not fit all,” identifying a broad spectrum of likely recruitment pools, and crafting messages in multiple formats are essential. Recruitment trends regarding a diverse workforce commonly fall into two categories – developing a work environment that values diversity and is free of bias, and; reaching out to multiple identity and community groups consistently and in a manner that is appropriate and attractive to them.

Successful organizations recognize that diversity recruitment strategies are about (1) ongoing management of people to invite and appreciate diversity and (2) maintaining relationships within local, regional, and national communities that serve the needs of a variety of populations. Establishing and maintaining such relationships with individuals and community organizations proves indispensable.

Best practice trends also include the creation of multiple recruitment messages that articulate how the organization meets the needs of, and appeals to the values of, diverse employee populations, followed by the articulation of such messages in multiple forums using multiple formats.

For example, an organization struggling to fill assembly-line positions achieved success by re-writing job advertisements so as to appeal to younger generations. In this instance, reference to die casting machine parts was followed by the phrase “helping people enjoy the great outdoors.” Another organization responded to the emerging trend of millennial generation “helicopter parents” by asking applicants if they would like a packet of material that’s prepared for family members.

Best practices for long-term strategies for effectively recruiting candidates from diverse populations include the following types of activities:
Establish a presence at organizations at area high schools and colleges that serve the needs of students from diverse populations – such as sponsoring student groups or activities, providing internships and scholarship programs.

Identify existing relationships between the organization’s leaders and affinity groups for diverse populations and use these relationships to enhance the organization’s recruiting efforts with the specific diverse group. In addition, establish accountabilities for appropriate individuals within the organization to develop and maintain relationships with diverse groups, colleagues, and community organizations to further recruiting efforts. Establish relationships with numerous recruiters that specialize in sourcing candidates from diverse populations.

Participate in career education programs or other activities specifically designed to attract students from diverse populations. Sponsor professional events within multicultural communities.

Provide bias reduction training to all employees involved in the hiring process.

Identify specific population groups, such as veterans, retirees, people with disabilities or other sometimes overlooked sources and work in conjunction with organizations that include such individuals to enhance recruiting efforts.

Send members of the organization’s leadership to local diversity conferences, affirmative action compliance council meetings, and similar activities in a variety of professions.

Prepare materials and interview candidates in their first language, as applicable to job responsibilities.

Invest in upgrading your website to use it as an effective recruiting tool. The first step would be to list available positions on your website. “Whistles and Bells” such as virtual tours of your facilities, testimonials from satisfied employees and other enhancements can be added as resources allow.

Advertise across the broadest media spectrum possible, within as many area communities as possible.

Regardless of the population being recruited, successful recruitment strategies demonstrate to the applicant that acceptance of employment at any level can lead to an advancing career within the organization.

It is also important to evaluate the success of various recruitment strategies. Determine which sources are providing the best hiring results and work to build on these strengths. Decide if other sources that have been less successful should continue to be part of the organization’s strategy or if it will concentrate efforts where there has been more success.

After carefully evaluating the success of their recruiting strategies, Texas Instrument developed the following approach

People planning – evaluating how many people will be needed and ensure that these hires are within the organization’s financial plans

Developing Performance Profiles – extensive job descriptions

Centralized Sourcing – HR plays a key role in sourcing and manages an employee referral program that results in 50% of new hires coming from employee referrals
• Business-Specific Recruiting – recruiters are dedicated to each of the major divisions of the company
• Assessment and Selection – team-based interviews that include behavioral based questions and technical questions (HR Magazine, 2007).

The key is to identify the benefits of working in a specific industry, for a specific organization. The water industry, and specific entities within that industry, need to identify what makes their opportunities attractive to applicants and present this information in such a way that the applicants see the opportunities in a positive light.

Displayed below are charts and graphs that display information gathered through EA’s 2007 Recruitment and Retention Survey. This survey included 504 organizations with the following demographic breakdowns:

<table>
<thead>
<tr>
<th>Industry</th>
<th>N</th>
<th>Size (sales $)</th>
<th>N</th>
<th>Number of Employees</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Utilities</td>
<td>14</td>
<td>Under $1 mil</td>
<td>28</td>
<td>Under 100</td>
<td>226</td>
</tr>
<tr>
<td>Printing and Publishing</td>
<td>16</td>
<td>$1,000,001 - $5 mil</td>
<td>79</td>
<td>101 - 500</td>
<td>217</td>
</tr>
<tr>
<td>Construction</td>
<td>16</td>
<td>$5,000,001 - $10 mil</td>
<td>65</td>
<td>501 - 5000</td>
<td>57</td>
</tr>
<tr>
<td>Soc. Serv., Ed., Pub Admin.</td>
<td>24</td>
<td>$10,000,001 - $50 mil</td>
<td>162</td>
<td>5001 or more</td>
<td>4</td>
</tr>
<tr>
<td>Retail/Wholesale Sales</td>
<td>25</td>
<td>$50,000,001 or more</td>
<td>129</td>
<td>TOTAL</td>
<td>504</td>
</tr>
<tr>
<td>Adv. Manufacturing</td>
<td>40</td>
<td>No answer</td>
<td>41</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other Service</td>
<td>58</td>
<td>TOTAL</td>
<td>504</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>59</td>
<td>Location</td>
<td>N</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Professional Services</td>
<td>61</td>
<td>West</td>
<td>23</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manufacturing</td>
<td>191</td>
<td>North East</td>
<td>41</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>South East</td>
<td>151</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Midwest</td>
<td>289</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>TOTAL</td>
<td>504</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Respondents were asked to identify their top three, most effective, recruiting sources. Effective was defined as being able to generate applicants who accepted employment with them. This following charts display recruiting sources for engineers, scientists, process operators, skilled labor, customer service, and all positions, based on their level of effectiveness.
**Effective Recruiting Sources for Engineers**

- Percentage of Who Selected Source as Top in Effectiveness

Source: EA Recruitment and Retention Survey, 2007

**Figure C-7. Effective Recruiting Sources for Engineers**

**Effective Recruiting Sources for Process Engineers**

- Percentage of Who Selected Source as Top in Effectiveness

Source: EA Recruitment and Retention Survey, 2007

**Figure C-8. Effective Recruiting Sources for Process Operators**
Effective Recruiting Sources for Scientists

Source: EA Recruitment and Retention Survey, 2007

Figure C-9. Effective Recruiting Sources for Scientists

Effective Recruiting Sources for Skilled Labor

Source: EA Recruitment and Retention Survey, 2007

Figure C-10. Effective Recruiting Sources for Skilled Labor
Source: EA Recruitment and Retention Survey, 2007

Figure C-11. Effective Recruiting Sources for Customer Service

Source: EA Recruitment and Retention Survey, 2007

Figure C-12. Effective Recruiting Sources for All Positions
Selection

Organizations use a variety of tools to assess applicants for available positions. The most frequently used selection method is a face to face interview with the applicant. However, in spite of its popularity, interviewing is usually one of the least reliable and valid pre-employment assessments.

Many organizations have found including instruments that measure the applicant’s skill, knowledge, and behavior traits in the selection process can improve the likelihood that the applicant will be successful in the position. Appropriate selection can help ensure that the employee will be able to learn and perform the job and is a key to retention.

The chart below displays the other types of selection instruments used by those who responded to the EA 2007 Recruitment and Retention Survey. The most common type of screening reported was drug testing (63%).

![Selection Methods in Addition to Interview](chart.png)

Source: EA Recruitment and Retention Survey, 2007

Figure C-13. Selection Methods in Addition to Interview

The chart below shows the percentage of those who have no difficulty retaining engineers compared with those who have some difficulty retaining engineers on their use of three different types of assessments, (1) skills and knowledge, (2) behavior and trait, and (3) drug testing. In each case, there is a higher percentage of those who have no difficulty retaining engineers using the assessments than those who have some difficulty retaining engineers.

©2008 AwwaRF. ALL RIGHTS RESERVED
### Other than interviewing, what selection methods do you use for Engineers positions?

<table>
<thead>
<tr>
<th>Selection Method</th>
<th>Percent of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skills/knowledge testing</td>
<td></td>
</tr>
<tr>
<td>No difficulty retaining</td>
<td>34%</td>
</tr>
<tr>
<td>Some difficulty retaining</td>
<td>31%</td>
</tr>
<tr>
<td>Behavior/trait assessments</td>
<td></td>
</tr>
<tr>
<td>No difficulty retaining</td>
<td>35%</td>
</tr>
<tr>
<td>Some difficulty retaining</td>
<td>27%</td>
</tr>
<tr>
<td>Drug/alcohol testing</td>
<td></td>
</tr>
<tr>
<td>No difficulty retaining</td>
<td>73%</td>
</tr>
<tr>
<td>Some difficulty retaining</td>
<td>66%</td>
</tr>
</tbody>
</table>

### TRAINING

#### Definition

Training refers to the planned efforts of an organization intended to facilitate employees’ learning of job functions and competencies. Training can be specific to the position duties, or it can cover broader areas, such as safety standards across the organization, or understanding organization policies and procedures.

#### Statement of the Problem

Employers are finding that many of their new employees don’t have the basic skills that are required for their jobs. Employers then are faced with either letting the individuals go, which requires additional recruiting to fill the positions, or settling for less than desired results because of the employees’ lack of skill, or providing training for the employee. Training can require significant investments of time and effort, thus resulting in increased expenses.

In addition, changing technologies and markets require that employees learn new procedures and adapt their work style to fit emerging situations. Therefore, training becomes a continuous activity. Because of its importance, it is prudent for employers to develop effective training strategies and tactics to help ensure employees are able to perform their work effectively and efficiently.

The fact that for many new employees, English is a second language also presents challenges for employers that can be addressed by training. Both training the new employee to speak, write and understand English at the required level, and training managers of such employees the rudiments of the first language spoken by the employee can help the employee be more productive.

#### Training Needs Assessment

One of the most important and least practiced steps in effective training is conducting a comprehensive needs assessment to identify the training needs of employees. A needs
assessment process seeks to determine the gaps between the knowledge, skills, and abilities of employees and what is needed for them to perform their jobs in a desired manner. Needs assessments can use existing data from other sources, such as error rates, production levels, performance reviews and other documents as ways to identify gaps. However, it is generally necessary to conduct research to ensure that the training will address the specific needs identified.

A needs assessment also strives to determine whether the gap between existing performance and desired performance is due to individual knowledge, skills, and abilities, or whether the structure of the position, the work flow, organizational constraints, or other factors outside the individual employee are contributing to the gap. Usually, gaps exist for several different reasons. Training can address the knowledge, skills, and abilities, but, by itself cannot remove job or organizational barriers.

Creating a Learning Environment

Because there is a need to continually adapt to changes and to always be learning, organizations that foster a learning environment are more likely to succeed. The components of a learning environment are:

- Employees know why they need to learn something new.
- The training content is meaningful and employees can see the connection between what they are learning and their jobs.
- There is opportunity to practice new learning.
- Employees receive feedback on how well they have learned and how well they have applied the learning.
- Logistics of training run smoothly.
- Employees are given aids to help them commit training to memory and to serve as a resource to refer to after the training is completed.

Over the last 20 years, Peter Senge and others have popularized the concept of the Learning Organization. Such an organization is continually expanding its capacity to define its desired future and to create it. The Learning Organization practices the following five disciplines:

1. **Systems thinking** is a conceptual framework and tool to make patterns clearer and to help us see how to change them effectively. Systems thinking means being able to see the interconnectedness of multiple factors.

2. **Personal mastery** refers to experiencing a sense of being drawn by a calling rather than just doing something because it is asked, or seems like a good idea. Personal mastery means being so committed to the “calling” that one is willing to change his/her behavior to meet goal. It involves moving from a reactive view – things are done to me - to a creative view of life that says I have the power to choose what I do.

3. **Mental models** are deeply ingrained assumptions or generalizations that influence how we understand the world and take action. We are generally not aware of them at the conscious level and don’t realize they influence our
behavior. When practicing Learning Organization principles, admitting the existence of mental models is the first step in dealing with them and not allowing them to pull us in directions that don’t lead us to our true desired future.

4. **Shared vision** is holding a shared picture of the future we seek to create. The vision is so strong that it creates a sense of destiny. In order to be successful, an organization must help employees translate their personal visions into a shared vision for the entire organization.

5. **Team learning** is raising the intelligence of the group above that of any single member. To do so, it is necessary to approach disagreement as an opportunity to learn. Team learning requires the development of the skills of inquiry, asking why someone thinks as they do, and advocacy, which means explaining the reasons behind one’s thinking and conclusions.

Creating a Learning Organization is not a quick process. Senge estimates that it takes as long as ten years to change a traditional organizational culture into a Learning Organization culture. However, it is not an all-or-nothing concept. Many organizations have realized increased success by focusing on a couple of the principles and taking steps toward creating a learning culture.

**Training Delivery Methods**

Training can be delivered in a variety of formats, including:

- One-to-one experiences between the employee and a designated trainer.
- On-the-job, usually done by a supervisor or lead,
- Mentor relationships,
- Formal classroom training, either at the employers’ location, or off-site,
- Self focused study, which can include
  - Training from a college, university or technical school,
  - Reading manuals, articles, books, etc.,
  - Studying electronic or web based materials.

The first critical training the employer provides is called on-boarding. On-boarding is a process that begins even before the applicant begins employment and follows through with that individual as they go through their orientation and their initial time on the job. It is intended to help develop a positive relationship between the individual and the organization. During orientation, the new employee learns about the company they have just joined. Orientation usually includes information about the organization, its history, mission and vision as well as information on the nature of the business, products/services offered, organizational structure and policies, specific job duties and general performance expectations.

During the on-boarding process which extends through the first few months of employment, employers generally provide additional training and feedback to new employees to help ensure that they can be successful at the organization. Successful
orientation and on-boarding processes can increase employee engagement, reduce turnover and bring new employees to a higher level of productivity in shorter periods of time.

An increasing number of organizations are not relying solely on supervisors to train employees but rather are designating trainers to show new employees how to perform their jobs and to introduce new procedures to existing employees. Supervisors can maintain accountability for seeing that the training happens, but others may be more skilled as trainers and may have more time to perform this important task.

Many organizations are finding that a mentoring relationship can help a new employee learn the important nuances of the organization’s culture that aren’t included in any training manual. A mentor is an experienced employee who provides advice and support to a more junior employee. Sometimes such relationships form on their own. However, in an attempt to help new employees develop, some organizations assign veteran employees to act as mentors to new employees. It is a different kind of training, but one that can be very effective with adequate training for the mentors.

Many employers are finding that web based training can be of great value. Asynchronous web based training provides the individual an opportunity to complete a training program at a time that is convenient for them, instead of everyone having to stop what they are doing to attend a classroom session. Also, web based training can be self paced; this allows the employee to spend the amount of time they need, and no more, to learn what is necessary.

Below is a graph that displays the training methods reported by those who responded to the EA 2007 Recruitment and Retention Survey. The most popular methods are having a peer or the supervisor provide on the job training.

![Training Methods](image)

*Source:* EA Recruitment and Retention Survey, 2007

**Figure C-14. Training Methods**

**Measurement of Training Effectiveness**

Another element of training that is often not given adequate attention is the evaluation of the effectiveness of training. Training requires a significant investment of resources –
time, effort, expense, and as such, should be evaluated as extensively as any other major investment.

Many organizations ask participants to evaluate training after they have completed some type of program. This is a good starting point, but too often is the only evaluation that is done. The design phase of the program is the ideal time to determine when and how evaluation will take place.

The popular Kirkpatrick model explains four different levels of evaluation. The first is participant evaluation of the program. This is usually done by having participants complete an evaluation form immediately after completing the program.

The next higher level is an assessment of whether or not learning actually occurred. One method for this level of evaluation is the pre test and post test model. Using this approach, participants are tested before the training program to assess their current knowledge or skill. Then the test is completed after the training program and the scores are compared. The increase in scores, if there is one, is considered a measure of the learning.

The next highest level of evaluation requires a measurement of whether or not behavior actually changes as the result of training. For example, if one group of workers receives safety training and another does not, the safety records of the two groups can be compared. If those who participated in the training achieve better safety records, it may be an indication that the training caused the participants to change their behavior to work more safely.

The highest level of evaluation looks at whether the organization realizes benefits from the training. In this method measures of productivity, profit, and other results, before and after training, can be compared. Training that not only resulted in learning, but also caused a change in behavior that created more favorable results, meets all the criteria for evaluation for this model.

Evaluating the effectiveness of training takes time and effort, but it can help ensure that employees are given the opportunity to learn skills and acquire knowledge that is directly related to organizational success.

Twenty four percent of respondents to the 2007 EA Recruitment and Retention survey indicated that they did not evaluate training effectiveness. The following chart displays the methods used in response to the question, How do you evaluate the effectiveness of the training you provide? The most frequent training evaluation methods are to measure or evaluate work done after the training (49%) and ask participants to evaluate training (45%). Few follow the more involved, yet admittedly more accurate method of measuring or testing both before and after training to determine the impact the training had on knowledge acquisition and behavior change.
Source: EA Recruitment and Retention Survey, 2007

Figure C-15. Training Evaluation

Responding to Changing Demographics/Trends

As with recruiting and other employment related practices, training programs and strategies must adjust to meet the needs of an increasingly diverse employee population.

Numerous examples exist of how organizations can systemically implement training and development initiatives to help managers and employees be prepared to deal with increasing diversity. For example, one organization provides all managers an individual assessment regarding cultural competency, followed by group training and individual coaching to support each manager’s developmental process. Another organization routinely offers lunch time cultural awareness programs, discussion groups and facilitated dialogue that targets specific diversity concerns occurring within the organization at employee, department and/or team levels.

Regardless of an organization’s predicted workforce demographics, successful diversity training strategies include a supportive, proactive process with both a top-down and bottom-up management approach. To achieve the greatest transfer of training, the learners must be engaged in concepts related to current on-the-job activity, and they must be able to immediately use the new knowledge, skills or ability at work.

Trends and best practices for systematic training efforts include the following types of activities:

- Ongoing individual and group coaching to help the leadership base develop competency and effectiveness.
- Use of assessment, design, implementation, and evaluation systems which account for varying learning styles and cultural preferences. For example, some immigrants are reluctant to tell their supervisor that they don’t understand a procedure. To help ensure that such employees are learning, it may be advisable to have a peer frequently ask such an employee if they have questions.
Employees from some cultures would be much more likely to admit that they didn’t know something to a peer than someone in position of power.

- Culture-specific training regarding group patterns, archetypes, and stereotypes. Such programs can include assessment tools such as the Intercultural Developmental Inventory, which provides feedback to individuals regarding their approach to intercultural relations, or the Intercultural Conflict Styles Inventory that measures four culturally learned styles for managing conflict. The tool is designed to enable employers to maximize positive and productive interactions among diverse cultural groups.
- Training employees at all levels to express needs and emotions in a culturally relevant manner.
- Change management training regarding understanding and responding to the needs of employees with diverse needs, cultures, and viewpoints and accepting the inevitability of change.
- Language training for supervisors and leads with employees speaking multiple languages and occupational English training for employees speaking English as a second or third language.
- Using multiple training methods to help ensure that employees learn regardless of their preferred learning style.
- Making use of new technologies to provide learning opportunities for employees at various locations and to allow some self-paced learning experiences. Use of computer-based learning may require training in the use of technology to allow workers who are not as familiar or comfortable with that method to gain confidence in their ability to use technology before having to learn content from this method.
- Closely related to training is the concept of knowledge management. Knowledge management systems consolidate dispersed knowledge and allow it to be shared by the whole organization. They can also codify the extensive experiences of those who will be exiting the workforce through retirement. Such systems help ensure that the knowledge gained from years of experience doesn’t exit the organization when the employee exits the company. However, they are not a common practice among organizations. The 2007 EA Recruitment and Retention Survey found that 85% of respondents indicated that they did not have a formal knowledge management system to capture the knowledge of departing or retiring employees.

RETENTION

Definition

Retention refers to the ability of an organization to keep employees.

Statement of the Problem

All organizations experience turnover. Some of it is unavoidable and a certain amount of turnover provides opportunities to bring in employees with new ideas and
experiences that can help refresh the organization and help it develop and grow. Organizations can expect that employees will retire; some will become ill and be unable to return to their jobs; move out of the area; or for other reasons find it necessary to leave the employer. However, unnecessary or excessive turnover can create difficult situations for employers. According to a report by the Society for Human Resources Management, turnover costs the United States economy $5 trillion per year.

The employer also instigates some turnover, such as reductions in force or terminations due to poor performance or other reasons. When discussing retention the most significant issues center on the ability to retain talented employees that the employer wishes to retain. Retention is frequently cited as the most, or one of the most critical challenges organizations face. When asked by a survey from Entrepreneur Magazine, 73% of CEO’s responded that retention was their most important concern.

As discussed in other sections of this report, the changing demographics, specifically the retirement of baby boomers, is creating more job openings and the smaller size of the Y generation (or Millennials) to fill these opening puts more pressure on an organization to retain qualified employees. The Generation Y employees also, generally, feel less loyal to an employer and accept more personal responsibility for building their own career and thus are more likely to change jobs more frequently than older generations.

In addition to demographics changes, the improving economy also causes an increase in turnover. Employees, who may not have felt comfortable leaving a job when times were tight, begin to feel more confident about the job market as the general economy sustains improvement. They are thus more likely to seek other employment now than they are during economic downturns.

**Strategies and Practices**

The following chart displays the retention strategies and practices reported by the respondents to EA’s 2007 Recruitment and Retention survey.

![Retention Strategies Chart](chart.png)

*Source: EA Recruitment and Retention Survey, 2007*

**Figure C-16. Retention Strategies**
Retention strategies fall into two different broad categories. One is comprised of efforts specifically designed to retain employees. These include practices such as providing increased benefits for longevity. The other category is not specifically intended to address retention, but rather to create a positive working environment, and subsequently, has increased retention as a result. For example, creating an open and welcoming culture that invites employees to share their ideas can result in increased retention. However, the culture was molded to provide a positive work experience that results in improved productivity, and greater commitment, thereby results in better retention.

There certainly are specific practices that appear to contribute to retention, but employee satisfaction and sense of engagement is the best predictor of retention. Employee satisfaction and engagement depend on a myriad of factors that must be incorporated into the organization’s culture. It is prudent for an employer to assess the level of employee satisfaction or engagement and to address issues of concern raised by employees. Measuring employee satisfaction and engagement can be done through surveys, focus groups, interviews and other methods that allow employees to express their candid opinions.

Another factor that has been demonstrated to be related to employee satisfaction is customer satisfaction. Studies have shown that organizations that have high customer satisfaction ratings also have high employee engagement ratings. Also, organizations which are financially successful over the long term also have better retention (Barr, 2002).

The following are some of the most common reasons employees voluntarily terminate:

- Compensation,
- Challenging work,
- Opportunities to learn and grow,
- Work relationships,
- Recognition and,

**Compensation**

Some employers intentionally pay above market in order to retain high potential employees. Talented employees can be lured away by above market salaries that are being paid by these organizations for critical positions. Pay packages can include attractive additions over the traditional base pay, such as stock options, (which are perceived to have value, if the organization is believed to be well managed and likely to be successful), bonuses, and individual and team incentive plans.

The chart below shows data from the EA 2007 Recruitment and Retention survey regarding starting salaries for engineers. It shows that a higher percentage of employers who pay above the market rate, report that they have no difficulty retaining engineers, when compared with those who indicate that they have some difficulty retaining engineers.
The following chart from the same survey shows that pay is less frequently mentioned as a reason for terminating for those engineers leaving an employer who reports no difficulty retaining engineers than those terminating from an organization who reports some difficulty retaining engineers. This difference is statistically significant.

<table>
<thead>
<tr>
<th>Reason given for voluntary termination from engineers</th>
<th>Frequently Stated</th>
<th>Sometimes Stated</th>
<th>Not Stated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pay No difficulty retaining</td>
<td>3%</td>
<td>38%</td>
<td>31%</td>
</tr>
<tr>
<td>Pay Some difficulty retaining</td>
<td>19%</td>
<td>46%</td>
<td>23%</td>
</tr>
</tbody>
</table>

However, compensation will not by itself retain employees. Compensation has been demonstrated to attract employees, but will not overcome a poor work environment, job dissatisfaction or lack of recognition (Towers-Perrin, 2006). Generally, employees want to be paid competitively, but factors other than pay influence their decisions to stay or leave.

**Challenging Work**

Talented employees want work that is interesting and has an impact. They also expect that work systems will be well designed and that appropriate resources will be provided. Such employees want work to help fulfill some of their personal achievement goals.

Some studies have shown that, particularly in high tech fields such as engineering, employees feel that they have to leave an employer after a few years because that is the only way to move up. They perceive that if they stay at their current employer they will be pigeon-holed into one specialty and will not be given challenging, new assignments.

Organizations that find ways to offer challenging work to their employees will not only benefit from retaining these employees, but also benefit by accessing more of their talents. Challenging work can provide opportunities for individuals to contribute to the organization at a higher level than if they are merely performing the routine tasks of their jobs.

**Opportunities to Learn and Grow**

Opportunities to learn and grow are closely related to providing challenging work. High potential employees want the opportunity to expand their knowledge and skills and move into positions that offer growth. Particularly employees in rapidly changing fields, such as technology, science and engineering want to stay current with developments in their field.

Another successful strategy is the development of plans intended to move employees to greater levels of responsibility, making sure this plan accounts for the needs of diverse
populations. This strategy often includes the creation of rotation and transition periods where employees are permitted to “try out” new positions with the knowledge that they can return to their previous position if desired.

Frequently the lack of opportunity for learning and growth is cited as the underlying cause of more than two thirds of voluntary turnover. When saying that learning and growth is important to employees it does not mean that everyone is expecting to be promoted frequently. Most employees understand that advancement to higher level positions is limited and that not everyone will be able to assume a higher position, however, employees are looking for opportunities to learn and grow horizontally, as well as advance vertically. This is particularly true for technical and scientific positions where there is usually a greater desire to stay in the technical track but to expand one’s knowledge and experiences.

A component of offering employees the opportunity for growth and development is providing them with constructive feedback regarding their performance. Most organizations conduct annual employee performance reviews. Many are encouraging more frequent, less formal meetings between employees and their managers to help the employee understand how their performance is being viewed so that there are no surprises when the annual review occurs.

Some organizations also provide employees feedback about their performance from peers, direct reports, and customers, in addition to feedback from their manager and their own self review. Such reviews are referred to as 360 degree feedback; based on the concept of a circle having 360 degrees. Below is a chart that displays the performance review practices reported by those who responded to the EA 2007 Recruitment and Retention Survey.

![Performance Review Practices](chart_url)

Source: EA Recruitment and Retention Survey, 2007

Figure C-17. Performance Review Process

Work Relationships

Employees report that one of the most important factors in determining whether they will stay with an employer is the relationship they have with their immediate supervisor.
This individual is their conduit to the organization and it is the relationship with the immediate supervisor that greatly influences the employee’s perception of the entire organization.

Other relationships that influence retention are those with co-workers and a sense of being a part of the whole organization. A recent survey showed that over 80% of employees said that working with low-performing co-workers would be a reason they would change jobs (Leadership IQ). The manager therefore is not only responsible for creating a positive relationship one-to-one with the employee, but also for managing the performance of the entire unit to encourage retention. The manager also can help the individual employee and department see their connection to the organization and how what they are doing is related to strategic goals and objectives.

**Recognition**

Employees prefer to be recognized for their achievements in different ways. High potential employees want to know that their efforts are noticed and appreciated. Some employees want public accolades, some like plaques or certificates, some prefer a private “well done” from their manager, but everyone wants recognition. It is important for the manager to understand how the employee wants to be recognized and to see that appropriate recognition is given.

Employees who feel that they are not treated with respect are over three times more likely to resign than employees who believe they are treated respectfully (Siorta Survey). The key is recognizing and adapting to each employee’s understanding of how respect is demonstrated.

Employee recognition comes in many different forms. Some companies provide special recognition associated with tenure. Others try to recognize significant accomplishments at the end of a project or at different times during a business cycle.

The most appreciated form of recognition, as indicated by survey responses, is something direct from the person’s supervisor or manager. Employees appreciate gifts and having their names listed as “employee of the month.” However, having their immediate supervisor complement them on a job well done, having the manager stop by their work area and tell them they are appreciated means the most to them. “Spot rewards” such as gift certificates for movies, dinners or items of similar value that accompany the manager’s personal recognition are more appreciated than annual gifts at holidays or year end.

In the 2007 EA Recruitment and Retention survey over 75% of respondents indicated that they had some recognition practices. The following chart displays that the most common of these are (1) some type of employee recognition dinner or picnic, and (2) bonuses based on individual performance.
Employee Recognition Activities

Source: EA Recruitment and Retention Survey, 2007

Figure C-18. Employee Recognition Activities

Work/life Balance

There is an increasing awareness of the need to find balance between our work life and our life outside of work. The use of cell phones, laptops and other electronic devices enables communication between employee and employer regardless of time and/or location. Whereas this easy access to communication can make work more productive, it also means that as long as one is electronically tied to work, one is not totally away from work. The need to relax is key to long term success and actually separating from work for uninterrupted breaks is a rare, but necessary, occurrence.

Many employees rank work/life balance as one of their top issues when deciding to change employers. Over 25% of working women report that they are looking for different jobs because they are unsatisfied with the work/life balance they are experiencing with their current employer (Career Builder).

Culture as a Retention Factor

As mentioned earlier, retention strategies include (1) activities that are designed specifically to retain employees and (2) side benefits from a positive, organizational culture. According to a survey of over 50,000 employees, making employees feel engaged with the organization not only has a positive effect on their level of effort, but also on their intent to leave or stay with the organization. Increasing employee engagement can result in an 87% reduction in an employee’s intent to leave an employer (Lockwood, 2005).

Employee engagement is a rare commodity. The Gallup organization’s Workers Index reported that only 29% percent of employees responded that they were engaged at work. Those organizations who can foster a culture of engagement will benefit. Communication is a cornerstone to creating an engagement culture. Employees who feel that they understand the business they work in and feel they are kept abreast of important
developments are much more likely to be engaged and thus stay with an employer. A recent study found that employers who have a highly engaged workforce are 20% more likely to report lower turnover than their competitors (Eversole, 2006).

Sensis, an advertising and search firm, provides an example of an organization that experienced tremendous improvement by increasing their employee engagement. They were experiencing unplanned turnover of 45% per year and were not achieving their objectives. Over a three year period, the organization focused on developing programs that inspired employees and encouraged their participation. The result was that 80% of employees reported that they felt supported to initiate innovative solutions to organizational problems and 82% indicated that they were engaged with the business.

Organizations create cultures that reflect their values and their basic principles. Below is a chart that displays the words used to describe the cultures of the organizations who responded to the EA 2007 Recruitment and Retention Survey.

![Description of Culture](image)

**Source:** EA Recruitment and Retention Survey, 2007

**Figure C-19. Description of Culture**

It is interesting to note that there is a difference between those employers who reported no difficulty retaining engineers versus those who reported some difficulty retaining engineers. These differences are displayed below. A higher percentage of employers who said they had no difficulty retaining engineers described themselves as “competitive” and as “empowering employees” than did those who report having some difficulty retaining engineers. These differences are statistically significant. Obvious differences also occur when looking at work/life balance and quick, frequent change, although these difference didn’t rise to the level of significant difference in this study.
Responding to Changing Demographics/Trends

Enhancing retention among diverse employees often includes management and employees developing an acceptance of, and openness to, the presence of multiple identities, perspectives, work styles, and values within work teams. This is most often accomplished by long term departmental and organizational efforts which aim to compliment training initiatives.

Specifically, organizations successful at retaining employees from diverse populations acknowledge the difference between “assimilation” and “integration.” Many organizations are successful at teaching employees and managers the difference between these two concepts by using the analogies, respectively, of a melting pot and a mosaic. In the melting pot all the differences blend together without distinction. In a mosaic each individual part retains its unique characteristics, which at the same time, contributes to the whole picture. It is this mosaic mindset which tends to help organizations achieve success at retaining diverse populations.

Additionally, organizations most successful at retention across diversity help the workforce build commonality among differences while at the same time acknowledging and adapting to differences. This is the hallmark of organizations most successful at retention of diverse employees – movement beyond the premise of we are all really alike, to include the more nuanced understanding that appreciating differences is tantamount to success. Less successful organizations operate from a premise of, “If we can all get along we can resolve our differences.” More successful organizations operate from the premise, “If we can resolve our differences, we will be able to get along.”

One organization dramatically reduced its early stage turnover, thus increasing retention among immigrant employees after creating virtual job try-outs and streaming video of people fulfilling job tasks. These were followed by the same individuals stating in their own native languages how the organizations values aligned with their own.

Source: EA Recruitment and Retention Survey, 2007
Best practices suggest that organizations are well served by proactively addressing the needs of the employees of a diverse workforce. Organizations that talk about potential practice and procedure changes that will be implemented to adapt to the needs of employees from diverse populations before such employees begin working, experience greater levels of retention than do organizations responding reactively to the needs of diverse employees.

Retention efforts are most successful when tailored to specific organizations, communities, and individuals, allowing for unique needs and circumstances. One organization allows a greater number of floating holidays so employees can select their religion’s high holy days when they do not match the organization’s holiday calendar. This same organization also has a large percentage of Muslim employees in its manufacturing supervisory base – it has now established extended coverage and leave policies so that, after a period of service, employees can take an extended leave without pay (in this case to travel to Mecca), returning to work without a break in service. During this leave, employees can elect to continue health insurance coverage by paying both the employer and employee contributions. Removing the employer’s previous “no-rehire” policy and establishing the coverage and leave policies has increased retention among the company’s Muslim supervisors and has had no negative impact among other populations.

The chart below displays the activities engaged in by respondents to EA’s 2007 Recruitment and Retention Survey regarding diversity. The most common actions include (1) maintaining an awareness of local demographic trends, (2) training managers on diversity, and (3) forming relationships with organizations serving diverse populations. However, the most frequent response was that the organization had no specific diversity activities (47%).

![Diversity Activities Chart]

**Source:** EA Recruitment and Retention Survey, 2007

**Figure C-21. Diversity Activities**

Regardless of how an organization acquires its workforce, best practices pertaining to retention of diverse employees include the following types of activities:
• Identifying accountability for formal and informal change efforts within the areas of diversity recruitment, training and retention.
• Providing programs intended to help employees establish and increase their willingness to explore ideas and concepts from multiple perspectives.
• Creating programs designed to establish and solidify, within employees at all levels, an awareness and appreciation for the challenges and opportunities inherent in a diverse workforce.
• Orientation programs that help ensure that new employees receive the information and support they need for initial success.
• Fostering among key workers, at all levels, the responsibility to practice appropriate day-to-day retention activities. Retention of a diverse workforce requires not only action of the part of management, but also employees at all levels.
• Establishing employee resource groups designed to educate the overall workforce regarding specific groups of employees and support the unique needs of an organization’s specific populations.
• Creating structures that allow for job rotation, job sharing, flexible scheduling, extended leaves, and other similar practices. Managers should foster the use of such practices to meet the unique needs of different employees.
• Pairing new employees with mid- and long-term employees for an on-boarding process that leads to coaching and mentoring relationships.
• Creating flexible recognition, compensation and benefits plans that account for the needs of diverse employees.
• Preparing individual development plans for employees at all levels.

SUMMARY

Recruiting, training, and retention are interrelated. Organizations that spend the necessary time and effort to manage effective recruiting strategies are likely to have employees who are amenable to training, learn what is required on the job, and stay with the company. Scrimping on any one of these employment practices will have a negative impact on the other.

Keys for Successful Recruitment

• The most effective recruiting sources for all positions cited in the EA 2007 Recruitment and Retention Survey
  - were employee referrals
  - Internet job sites and
  - Newspapers.

• Specifically for recruiting engineers, the most effective recruiting sources were
  - Internet job sites,
  - search firms and
  - Employee referrals.
The water industry should consider reviewing its recruitment sources to ensure that the most effective recruiting sources are utilized.

- Employers who reported "no difficulty in retaining engineers" rated colleges, universities and/or trade schools as an effective recruiting source more often than those who had "some difficulty retaining engineers." This finding is statistically different. The water industry should review its recruitment practices at secondary schools as well as the use of internships and consider developing or enhancing their relationships with schools that can serve as sources of applicants.
- Most employers recognize that the workplace is and will continue to become more diverse. Employers will want to reach out to multiple identity and community groups to identify a broad spectrum of recruitment pools. This can be done by establishing and maintaining relationships within local, regional and national communities that serve the needs of a variety of populations.

**Keys for Successful Training**

- Effective orientation and on-boarding programs that provide new employees the information they need to perform their jobs and to feel supported in the positions reap long term rewards for employers. It may be necessary to include some basic training in English and communication for many new entrants into the work world for them to be successful. The members of the water industry should review their practices to ensure that new employees receive initial training in a timely and effective manner.
- Recognizing that employees have different learning styles and providing training in different ways will enhance an organization’s ability to actually have employees learn. Including a variety of methods of training such as one to one instruction on the job, classroom sessions, both onsite and from outside sources, computer based training, and providing written materials can help meet the needs of employees with different learning styles. Using web based training can enable an organization to reach employees regardless of their location. Providing training via the web gives employees more freedom as to when they take the training and allows them to absorb new information at their own pace.
- Just as important as providing a variety of training delivery methods is the development of a learning culture. Such a culture recognizes that all employees must continually learn in order to keep pace with the changing environment and to develop and implement innovative solutions to the challenges employees face. The water industry would be well served by examining which elements of the Learning Organization philosophy are most applicable to their situations.

**Keys for Successful Retention**

- The most successful retention programs take place in an environment comprised of engaged or otherwise empowered employees. Creating a culture where employees feel welcomed and respected results in lower turnover. The water
industry should objectively examine the working environment for their employees and take necessary steps to increase engagement and empowerment.

- Effective retention programs involve an array of activities related to compensation and benefits, challenging work, opportunities to learn and grow, maintaining positive work relationships, employee recognition and, work/life balance. No one program can address all retention issues, but the water industry would be well served to both institute programs specially designed to reward employees for tenure and to undertake broader initiatives to create an environment where employees want to stay.

- To be successful at retaining a diverse workforce organizations do well to:
  - Understand and recognize different needs and value sets of diverse populations,
  - Address demographic changes proactively,
  - Focus more energy on resolving differences rather than identifying commonality and;
  - Support management’s ability to implement activities in ways that are culturally relevant for each individual employee.

A critical component for success is for the organization to plan multi-prong approaches so that they are meeting the needs of an increasingly diverse workforce in an environment of accelerating change. The water industry can learn from the experiences of those in other domains, but must develop strategies that focus on the opportunities it offers and create environments that make employees want to stay.

There is no one simple, magic act that any employer can do to ensure that they will be able to hire, train and retain the individuals they want, but several small steps, built on a solid foundation of sound management practices will serve the water industry well.

REFERENCES


REFERENCES


<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACE</td>
<td>Annual Conference and Exhibition for American Water Works Association</td>
</tr>
<tr>
<td>AEESP</td>
<td>Association of Environmental Engineering and Science Professors</td>
</tr>
<tr>
<td>AFSCME</td>
<td>American Federation of State, County and Municipal Employees</td>
</tr>
<tr>
<td>AWWA</td>
<td>American Water Works Association</td>
</tr>
<tr>
<td>OTCO</td>
<td>Operation Training Committee of Ohio, Inc.</td>
</tr>
<tr>
<td>WEF</td>
<td>Water Environment Federation</td>
</tr>
<tr>
<td>WEFTEC</td>
<td>Water Environment Federation Technical Exhibition and Conference (WEF Annual Conference)</td>
</tr>
<tr>
<td>YPC</td>
<td>Young Professionals Committee</td>
</tr>
</tbody>
</table>