Water/Wastewater Operators

An analysis of the current and future workforce for water/wastewater operators in the Delmarva Region

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**Vision:** The Center for Industry Research & Workforce Alignment strives to be Delaware’s key source of labor-market insight to enable educational institutions to better align their program and training resources to meet the skill demands of business and industry.

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Introduction
This occupational brief seeks to provide Delaware Tech faculty and administrators with data outcomes and recommendations specific to Water/Wastewater Operators that will aid in course development, curriculum delivery and non-credit training and certifications that will give students an advantage in the job market upon graduation.

This survey data contained within this occupational brief was taken from a larger study that examines several disciplines of engineering technology within a 13-county mid-Atlantic region that includes the three counties in the State of Delaware and ten bordering counties where graduates of Delaware Tech are likely to find employment. The purpose of that labor market study was to examine current and projected employment levels, how these jobs are changing due to a variety of market drivers, and what Delaware Tech and other community colleges can do to ensure that associate degree programs accurately reflect the skill needs of employers in the near future.

This brief primarily highlights data and information specific to water/wastewater operators gleaned from an extensive workforce survey conducted in July of 2014 from a sample of over 7,400 companies in the region. Survey interviewers fully screened 400 firms for qualifying criteria. Surveying efforts resulted in 252 occupational-level completions from 153 firms. Several firms responded for more than a single occupation. Extrapolations of employment data were conducted to provide readers with a more comprehensive picture of current and projected workforce demographics and to perform a supply/demand gap analysis for the region. In addition, executive interviews were held with 17 individuals from 15 public and private sector firms and existing sources were researched for secondary supporting data.

A total of 44 employers responded to the regional survey for water/wastewater operators. The proceeding sections of this brief provide an overview of data outcomes and executive interviews held with employers of this occupation. Aggregate data for all occupations such as market drivers, soft skill needs, and can be found in the full labor market study available on the CIRWA web page at www.dtcc.edu/cirwa.

Water/Wastewater Treatment Operators - SOC 51-8031

Occupational Definition
Operate or control an entire process or system of machines, often through the use of control boards, to transfer or treat water or wastewater.¹

Figure 1 - Hiring Difficulty
Forty-one percent of the 44 firms that responded for water/wastewater operators find it difficult or very difficult to find a quality candidate to fill their position vacancies. Eighty percent of employers find it at least somewhat difficult to find a well-qualified candidate.

¹ O*Net Online, Summary Report for Water/Wastewater Treatment Plant Operators, Accessed September 11, 2014
Table 1 - Current and Projected Employment – Survey Data (n=44)
The data in the table below reflects data from survey responses only. Projected job change, retirements and turnover were combined to determine total 3YR and annual openings.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>456</td>
<td>509</td>
<td>+53 (12%)</td>
<td>59 (13%)</td>
<td>156</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>44 (9.6%)</td>
<td>52</td>
</tr>
</tbody>
</table>

Table 2 - Universe of Firms and Employment – EXTRAPOLATED REGIONAL ESTIMATES
From the survey’s qualifying incidence rate (percentage of firms screened that hire each occupation), CIRWA was able to determine the estimated total number of firms in the region that employ water/wastewater operators. After eliminating outliers out 2 standard deviations, CIRWA utilized adjusted employment level means to extrapolate regional estimates for employment and projections. Projected job change, retirements and turnover were combined to determine total 3YR and annual openings.

<table>
<thead>
<tr>
<th>Total Firms that Employ Water/Wastewater Operators</th>
<th>Current Employment</th>
<th>Projected Employment in 3 years</th>
<th>3YR Projected Openings</th>
<th>Total 3YR Openings incl. Growth</th>
<th>Annual Openings over next 3 yrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>195</td>
<td>1,498</td>
<td>1,665</td>
<td>+167 (11%)</td>
<td>132 (8.8%)</td>
<td>100 (6.7%)</td>
</tr>
</tbody>
</table>

Figure 2 - Educational Attainment of the Current Workforce – Survey Data (n=44)
Approximately 56% of the water/wastewater operator workforce holds less than an associate degree. Another 24% holds an associate degree or higher. This is consistent with data obtained through executive interviews given that Class I and II operators are not required to hold a 2YR degree to obtain licensure.
Figure 3 - Educational Hiring Requirements and Preferences – Survey Data (n=44)
The figures below demonstrate survey respondents’ required versus preferred educational attainment for a water/wastewater operator’s position in their firm. Sixty-six percent (66%) of firms (29 firms) that completed the regional survey require only a high school diploma for employment. However, 52% would prefer workers have an associate degree. Another 23% prefer job candidates have a bachelor’s degree. **Thirty-two out of 44 respondents (73%) indicated that they would prefer to hire at least one education level above what they currently require for employment.**

![Educational Hiring Requirements and Preferences](image)

**REQUIRED**
- None: 3
- High School Diploma/GED: 29
- Associate Degree or Equivalent: 9
- Bachelor’s Degree: 3

**PREFERRED**
- None: 2
- High School Diploma/GED: 6
- Associate Degree or Equivalent: 23
- Bachelor’s Degree: 10
- Post Graduate Degree: 3

Figure 4 - Entry-Level Wages – Survey Data (n=44)
Water/wastewater treatment operators are shown to receive the lowest average starting salaries with 21 of 44 (48%) firms offering an entry-level salary of less than $30,000 a year. Another 48% of employers offer starting salaries between $30,000 and $49,000 a year.

![Entry-Level Wages](image)

**Entry-Level Wages - Water/Wastewater Treatment Operators (n=44)**
- Less than $30,000: 21
- $30-39,000: 14
- $40-49,000: 7
- $50-59,000: 1
- $60-69,000: 1

Figure 5 – Barriers to Hiring Qualified Water/Wastewater Operators – Survey Data (n=44)
Forty-one percent (41%) of firms that employ water/wastewater operators find it either difficult or very difficult to find a highly-qualified worker for these positions. Respondents were asked to indicate all of the challenges they encounter during the resume review and interview processes. Responses are summarized below:

![Barriers to Hiring Qualified Water/Wastewater Operators](image)

- Lack of Relevant Work Experience: 71.4%
- Lack of Required Education/Training: 60.0%
- Lack of Job Position-Related Technical Skills: 62.9%
- Lack of “Soft” or “ Employability” Skills: 62.9%
- Lack of Applicants: 37.1%
- None of the Above: 2.9%
**Figure 6 - Top Technical Skill Needs based on Survey Data (n=44)**

The figure to the right illustrates the skills most frequently selected as “Extremely” or “Very Important” on a 5-point scale with an option for “Not applicable”. Larger circles reflect higher response counts. For this particular occupation, 90% of respondents selected 11 of the 15 listed skills and abilities as at least “Very Important”. The only item chosen by less than 60% of respondents was knowledge of the Principles of Stormwater Management. Interpreting Blueprints and Designs and Auditing Drinking Water and Wastewater Treatment Facilities were also chosen less frequently as being either “Extremely” or “Very Important” for Water/Wastewater Operators.

**Figure 7 - Preferred and Required Industry Certifications – Survey Data (n=44)**

Survey completers were provided with a list of industry recognized certifications for water/wastewater operators and asked to indicate which certifications they require for employment and which they prefer. Employers were also provided a “neutral” option if they had no preference. A summary of responses is provided below:

<table>
<thead>
<tr>
<th>Certification</th>
<th>Required</th>
<th>Preferred</th>
<th>Neutral</th>
</tr>
</thead>
<tbody>
<tr>
<td>OSHA - 30 Hour</td>
<td>5</td>
<td>14</td>
<td>25</td>
</tr>
<tr>
<td>HAZWOPER - 40 Hour</td>
<td>4</td>
<td>14</td>
<td>26</td>
</tr>
<tr>
<td>NICET Water/Wastewater Plants</td>
<td>8</td>
<td>12</td>
<td>24</td>
</tr>
<tr>
<td>NICET Water and Sewer Lines</td>
<td>4</td>
<td>15</td>
<td>25</td>
</tr>
<tr>
<td>Occupational Health and Safety Technologist (OHST)</td>
<td>4</td>
<td>17</td>
<td>23</td>
</tr>
<tr>
<td>Construction Health and Safety Technician (CHST)</td>
<td>3</td>
<td>15</td>
<td>26</td>
</tr>
<tr>
<td>Level 1 Wastewater Certification (State of De)</td>
<td>12</td>
<td>12</td>
<td>20</td>
</tr>
<tr>
<td>Water Certification (State of DE)</td>
<td>8</td>
<td>9</td>
<td>27</td>
</tr>
<tr>
<td>Delaware DOA Nutrient Management</td>
<td>2</td>
<td>8</td>
<td>34</td>
</tr>
</tbody>
</table>

Level 1 Wastewater Certification was recognized by 12 of the 44 survey respondents as required for employment. Eight employers also require the DE State Water Certification and NICET Water/Wastewater Plants. Survey taker’s preference for all of the other 7 listed certifications was fairly evenly distributed with between 8 and 17 firms responding that they prefer it for hire.
In an effort to determine what software programs students should be exposed to, employers of water/wastewater treatment operators were given a list of software programs commonly used in the industry. They were asked to select all of the programs that their technicians use on a day-to-day basis. The chart below provides a summary of the selected software:

- Microsoft Excel: 39
- Microsoft Word: 39
- Handheld GPS units: 18
- Microsoft Access database: 11
- Microsoft PowerPoint: 10

**Employer Insight Based on Executive Interviews**

The water/wastewater workforce is unique in that it is the only occupation examined in this study that is heavily regulated with strict guidelines governing required education and experience for each level of operator. While Delaware Tech does offer a 2YR degree program in Water Quality for Class III and Class IV Water/Wastewater Operators, Class I and II operators are only required to pass a non-credit certification course and obtain their license from the State. The College and a host of other regional community colleges and training providers offer certification programs to enable students to pass the state-issued licensure exam. Currently in Delaware, operators must complete an associate degree program and have no less than 4 years of operators experience to be eligible for Class III or IV operator status. Bachelor’s degree holders in this field tend to have graduated from an Environmental Science program.

In general, this tends to be a very competitive industry in terms of the workforce. It is not unusual for operators to “swap” between companies in exchange for higher wages, better location, etc. There are also many differences between the work environment and job requirements for operators employed in the private sector versus the public sector. While it is critical that certification providers continue their work to ensure enough Class I and II level operators to meet demand, water management agencies stress the importance of creating a seamless educational pathway where operators without a degree can continue their education to advance to a Class III and IV operator.

Aging infrastructure throughout the region and the ever increasing population are both key factors driving demand for these workers. Firms feel that a critical skill set operators may need more than ever in the coming years is increased mechanical and electrical knowledge as systems and components reaching the end of their lifecycle require more maintenance and troubleshooting on the job. Finally, knowledge of electronic documentation and data collection is becoming a significant need in this industry as companies shift to digital methods of mobile and handheld record keeping.

**Supply and Demand Gap Analysis**

Currently, Class I and II water/wastewater operators are not required to possess a formal degree for employment. Class I and II operators must possess the required certification and are licensed by the state. Educational institutions
are not required to report non-credit certificate completions into IPEDS. Therefore, gathering supply side data for this occupation is challenging because no formal reporting mechanism exists to record program completions.

The data provided below includes non-credit certification completions and for-credit Water Quality associate degree program completions for Delaware Technical Community College only. This is not meant to reflect a comprehensive picture of the supply of water/wastewater operators throughout the 13-county region.

Table 3 - Regional Annual Program Graduates

<table>
<thead>
<tr>
<th>CIP Codes &amp; Description</th>
<th>Delaware Technical Community College</th>
</tr>
</thead>
<tbody>
<tr>
<td>15.0506 - Water/Wastewater Operators (2YR Degree Program in Water Quality)</td>
<td>2</td>
</tr>
<tr>
<td>Non-Credit Base Level and Level 1 Certification</td>
<td>62</td>
</tr>
<tr>
<td>Non-Credit Level II Certification</td>
<td>12</td>
</tr>
</tbody>
</table>

Delaware Tech is the only community college in the region that offers an associate’s degree in water quality. Non-credit certification completions reflect a 3-year annual average from Delaware Tech’s Georgetown and Stanton Campuses. Given that CIRWA did not have access to a comprehensive picture of supply-side data for this occupation, CIRWA did not conduct a supply/demand gap analysis. However, a gap analysis may be a viable option for the future by contacting regional training providers and requesting annual completion data from them directly.

Conclusions and Recommendations

Overall, the employment outlook for water/wastewater operators in the region appears positive. Survey completers are generally optimistic about their ability to add jobs to the workforce over the next three years. Of the 247 firms screened that do not currently employ any of the engineering technicians examined in the survey, three firms indicated that they plan to hire for four new water/wastewater operator positions over the next 3 years. The conclusions on the next page were taken from the full study and have been adapted to reflect findings specific to the water/wastewater industry.

Conclusions

1. The need for certified and degree-holding water/wastewater operators will continue to rise due to population growth, aging workforce and infrastructure, and stricter regulatory requirements. Firms that were interviewed for this study conveyed that the region’s steady population growth paired with the construction of new housing subdivisions and commercial real-estate will be a major driver of employment growth. In addition, a great deal of the region’s infrastructure has reached the end of its lifecycle and skilled workers that can troubleshoot and repair problems will be a great need within this industry until new systems and equipment can be put in place. Finally, similar to the other occupations examined in this study, regulatory requirements and advanced technology have spurred demand for experienced, knowledgeable technicians that can commit to continued professional development.

2. Computer technology and software applications are changing the “must-have” skills needed for these jobs. Forty-nine percent (49%) of all survey respondents feel that advancements in technology, particularly software packages, is a key factor that will impact technical skill need over the next few years. The integration of hand-
held technology into everyday work responsibilities and the continued advancement of 3D drafting, GPS/GIS applicability and project management software are changing the way these firms do business and remain competitive in the marketplace. As a result, knowledge of these programs is in high-demand and, over the next few years, could become “must-have” for employment. In addition, federal, state and local codes, regulations and mandates such as Delaware’s new stormwater management regulations are constantly changing and surveying technicians must put in the necessary time and effort to remain knowledgeable on all of these requirements to avoid heavy fines and penalties for their employer or clients.

Recommendations

The recommendations below are listed so as to correspond to the conclusions listed above and can be generalized into two broad objectives:

- Closing the Gap in Projected Demand; and
- Improving Educational Programs to Better Meet Employer Needs.

1. **Promote involvement and partnerships with K-12 and other related organizations in an effort to increase teachers’, counselors’, parents’, and middle and high school students’ awareness of engineering technology options available to them.** Addressing a shortage of workers to meet demand begins with targeted efforts to boost awareness, interest, and enrollment in these programs. These efforts can be bolstered by developing statewide and regional strategies that engage not only K-12 education, but also organizations such as the Delaware STEM Council, trade associations, and other business and economic development agencies. Several survey respondents indicated that one of the drivers for increased technician employment will be greater recognition of the affordability and return on investment of 2-year degrees. The College would be well-served to emphasize these aspects to individuals looking to enter into a STEM occupation or who are currently in the process of choosing a career path.

2. **Consider adopting a cooperative workplace education experience or internship as a requirement for graduation.** Similar to the last CIRWA study focused on Mechanical and Electrical-related engineering technologies, interviewees were surprised to find that this is not already a requirement for Delaware Tech graduates given that many employers are moving away from hiring graduates without relevant experience. This requirement would help Delaware Tech accomplish the following:

   a. Expand the College’s network of companies that hire program graduates;
   b. Expose a greater number of companies to the variety of programs offered at the college;
   c. Demonstrate the skills and abilities of Delaware Tech program graduates over other hiring options available to companies;
   d. Provide students with relevant, real-life workplace experiences and situations that will enable them to be more competitive and attractive to local employers upon graduation; and
   e. Open students up to the possibility of securing employment prior to graduation which may, in effect, provide increased incentive to complete the program and improve graduation and placements rates for the College.

3. **Consider curriculum updates or changes that would place increased emphasis on exposing students to software applications, state codes and regulations and the importance of developing interpersonal and networking skills.** Programs may be well-served to integrate more exercises that utilize the software programs and applications identified by employers in this scan. In addition, emphasizing the importance and implications of federal, state, and local mandates and codes will help students recognize that continually staying updated and
knowledgeable about regulatory changes is a requirement of these jobs. Finally, exercises or group projects that focus on developing a student’s professionalism and confidence as well as business and marketing skills will help enable graduates to facilitate relationships and catalyze business opportunities for their employer.

4. Consider retiring the AAS in Water Quality program currently located at Owens Campus. This program is currently experiencing very low enrollment and graduation. Interviews with companies and agencies that manage the state’s water resources indicated that most of the technician level jobs in their firms do not require an associate degree, nor do they feel a degree is needed until the individual moves into a higher-level position. The positions that do require an associate degree are typically able to be filled by those holding an AAS in Environmental Science or Engineering Technology. However, firms also felt that greater exposure to certain elements of the Water Quality program within the current Environmental program would be very beneficial. In addition, providing a more direct pathway for associate degree holders to seamlessly continue their education to obtain a bachelor’s degree may be more easily achieved if students graduated with a degree in environmental science (given that Wesley College currently offers a degree in Environmental Studies).

The full labor market scan available at www.dtcc.edu/cirwa contains more generalized data for water/wastewater operators and other related occupations. Supplemental employment data for water/wastewater operators is provided in Appendix B of the full study. For further detail on the methodology of extrapolating employment estimates, please see the Methodology section in Appendix C of the full study.
Delaware Technical Community College established the Center for Industry Research & Workforce Alignment (CIRWA) in October 2011 as part of a U.S. Department of Labor Trade Adjustment Assistance Community College Career Training Grant.

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