Environmental Engineering Technicians

An analysis of the current and future environmental engineering technician workforce in the Delmarva Region

Author:
Veronica S. Buckwalter, MPA
Center for Industry Research & Workforce Alignment (CIRWA)
Delaware Technical Community College

Data Analysis:
Alan Phillips, MS
Center for Industry Research & Workforce Alignment (CIRWA)
Delaware Technical Community College
# Table of Contents

- Introduction ................................................................................................................................. Page 3
- Hiring Difficulty ......................................................................................................................... Page 3
- Current and Projected Employment ......................................................................................... Page 4
- Educational Attainment of the Current Workforce ................................................................. Page 4
- Educational Hiring Requirements and Preferences .............................................................. Page 5
- Entry Level Wages ..................................................................................................................... Page 5
- Barriers to Hiring Qualified Technicians ................................................................................ Page 5
- Top Technical Skill Needs .......................................................................................................... Page 6
- Preferred and Required Industry Certifications ..................................................................... Page 6
- Top Software Needs .................................................................................................................. Page 7
- Employer Insight Based on Executive Interviews ................................................................. Page 7
- Supply and Demand Gap Analysis .......................................................................................... Page 8
- Conclusions and Recommendations ....................................................................................... Page 8
Mission: The Center for Industry Research & Workforce Alignment, in close partnership with local businesses, government, and academia, delivers future-focused labor-market data and workforce information enabling educational institutions to make proactive and flexible decisions in response to the evolving workforce needs of Delaware’s competitive industries.

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.

This report was completed by The Center for Industry Research and Workforce Alignment (CIRWA), an initiative of Delaware Technical and Community College. It was completed in cooperation with the California Centers of Excellence as part of the USDOL-ETA Trade Adjustment Assistance Community College Career Training grant awarded to Delaware Tech in October 2011. Special thanks to the following individuals from the California Community Colleges’ Centers of Excellence:

Elaine Gaertner – Former Statewide Director of Centers of Excellence
Breakthrough Consulting Services
1218 Fiddlers Green
San Jose, CA 95125

John Carrese – Director, Bay Region Center of Excellence
City College of San Francisco
50 Phelan Avenue Cloud Hall, Rm 233
San Francisco, CA 94112

Zhenya Lindstrom – Director, San Diego-Imperial Regions Center of Excellence
Chaffey College
5897 College Park Ave
Chino, CA 91710

This workforce solution was funded by a grant awarded by the U.S. Department of Labor’s Employment and Training Administration. The solution was created by the grantee and does not necessarily reflect the official position of the U.S. Department of Labor. The Department of Labor makes no guarantees, warranties, or assurances of any kind, express or implied, with respect to such information, including any information on linked sites, and including, but not limited to accuracy of the information or its completeness, timeliness, usefulness, adequacy, continued availability or ownership.

Unless otherwise specified, this work by Delaware Technical Community College is licensed under a Creative Commons Attribution 4.0 International License: http://creativecommons.org/licenses/by/4.0/.
Introduction
This occupational brief seeks to provide Delaware Tech faculty and administrators with data outcomes and recommendations specific to Environmental Engineering Technology 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 environmental engineering technicians 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 42 employers responded to the regional survey for environmental engineering technicians. 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.

Environmental Engineering Technicians - SOC 17-3025 and SOC 19-4091

Occupational Definition
Apply theory and principles of environmental engineering to modify, test, and operate equipment and devices used in the prevention, control, and remediation of environmental problems, including waste treatment and site remediation, under the direction of engineering staff or scientist. May assist in the development of environmental remediation devices.¹

Figure 1 - Hiring Difficulty
Forty percent of the 42 firms that responded for environmental engineering technicians find it difficult or very difficult to find a quality candidate to fill their position vacancies. Seventy-six percent find it at least somewhat difficult to find a well-qualified candidate.

Table 1 - Current and Projected Employment – SURVEY DATA (n=42)
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>181</td>
<td>209</td>
<td>+28 (15%)</td>
<td>83</td>
<td>28</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 the occupation), CIRWA was able to determine the estimated total number of firms in the region that employ environmental engineering technicians. After eliminating outliers out 2 standard deviations, CIRWA utilized adjusted employment means to extrapolate regional estimates for current and projected employment. Projected job change, retirements and turnover were combined to determine total 3YR and annual openings.

<table>
<thead>
<tr>
<th>Total Firms that Employ Environmental Eng. Technicians</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>208</td>
<td>588</td>
<td>672</td>
<td>+84 (14%)</td>
<td>226</td>
<td>75</td>
</tr>
</tbody>
</table>

Figure 2 - Educational Attainment of the Current Workforce – Survey Data (n=42)
A large percent (34%) of environmental engineering technicians currently hold less than an associate degree. Approximately 42% of the workforce holds an associate degree or higher. Educational attainment is unknown for a relatively large portion (24%) of the current workforce.
The figures below demonstrate survey respondents’ required versus preferred educational attainment for an environmental engineering technician position in their firm. While only 2% of firms require a bachelor’s degree for hire, 64% of firms indicated that they would prefer a job candidate have one. An additional 33% prefer that job candidates have at least an associate degree. Of the 42 firms that were surveyed, 38 (90%) indicated that they would prefer to hire someone at least one education level above what they currently require.

Twenty-one of 42 (50%) firms that employ environmental engineering technicians offer an entry-level salary of between $30,000 and $39,000 a year. Three firms offer starting salaries of $50,000 a year or higher.

Forty percent (40%) of firms that employ environmental engineering technicians 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:
Figure 6 – Top Technical Skill Needs based on Survey Data (n=42)
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. Of the 42 firms that completed the survey, 33 chose Conducting Phase 1 Site Investigations as an “Extremely” or “Very Important” skill needed for their workers. Additional knowledge and skills frequently chosen as “Extremely” or “Very Important” include Principles of Stormwater Management, Conducting On-Site Environmental Inventories, Principles of Soil Classification, Auditing Industrial or Construction Sites and Principles of Ecology.

Figure 7 - Preferred and Required Industry Certifications – Survey Data (n=42)
Survey takers were provided with a list of industry recognized certifications for environmental engineering technicians 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:
Very few environmental engineering technician employers require the certifications listed in Figure 7 for hire at their firms. However, the most preferred certifications include the NICET Stormwater and Wastewater and NICET Erosion and Sediment Control. OSHA 10-hour and 30-hour certification, NICET Water/Wastewater Plants, NICET Water and Sewer Lines and Nutrient Management were also listed by several employers as “preferred” for hire.

Figure 8 - Top Software Needs for Environmental Engineering Technicians – Survey Data (n=42)
In an effort to determine what software programs students should be exposed to, employers of environmental engineering technicians were given a list of software 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 count of the selected software:

Employer Insight Based on Executive Interviews
All four of the firms CIRWA interviewed that specialize in environmental engineering or related services emphasized the importance of previous work experience for new graduates entering this field. In addition, industry-recognized certifications and trainings are highly desired given that these technicians frequently deal with hazardous waste or other pollutants. All four firms stated that having OSHA 40-hour and HAZWOPER certification would make an individual attractive for hire. In addition, a person looking to enter into this field should be able to demonstrate their skills and knowledge gained from extensive on-site work experience.

All four environmental firms, as well as two water management firms feel that Delaware Tech should consider changing the name of the environmental engineering technology program to environmental science. After reviewing the program curriculum and considering their firm’s specific needs, all felt that “environmental science” is the more appropriate name and a more desirable graduate at the 2-year degree level. When survey takers were asked what degree program they prefer to hire graduates from, 16 of 42 firms (38%) responded they have no preference and would hire either type of graduate. Fourteen (33%) indicated that they prefer to hire an environmental science graduate and 12 (29%) indicated they would prefer to hire an environmental engineering technology graduate.

Environmental engineering and science technicians are the only occupations within this cluster of jobs listed as a “Bright Outlook” occupation by the U.S. Department of Labor’s Employment and Training Administration. This is due to the high projected job growth and number of job openings predicted through the year 2022¹.

Supply and Demand Gap Analysis
Table 3 provides data on regional program completions for environmental engineering technicians. An annual average was calculated by pulling program (CIP code) completion data from the IPEDS database for a 3-year period (2011, 2012, and 2013) for all schools within the region that offer these programs and report completions to IPEDS. These average annual completions were added together to produce a total annual completion number for the region.

Table 3 - Regional Annual Program Completions (3-YR Annual Avg.)

<table>
<thead>
<tr>
<th>Regional Educational Programs</th>
<th>Delaware Technical Community College</th>
<th>Wor-Wic Community College</th>
</tr>
</thead>
<tbody>
<tr>
<td>15.0507 - Environmental Engineering Technology</td>
<td>5</td>
<td>1</td>
</tr>
</tbody>
</table>

Data pulled from IPEDS shows that this region is producing approximately 6 environmental engineering technicians annually. Table 4 below compares extrapolated openings estimates to average annual completions. Based on this comparison, the region could potentially be facing a shortage of approximately 69 workers annually.

Environmental science and engineering technicians have the strongest national location quotient (1.26)³ of all the occupations covered by this report. This means that, compared to the rest of the nation, these jobs have a higher than average concentration in the region. While survey growth projections taken from data may be slightly inflated due to inherent bias of self-reported data provided by responding firms, EMSI workforce projections also predict growth in these occupations, although at smaller rate of 4.6% through 2017. It is also important to remember that currently, about 34% of this workforce holds less than an associate degree. Therefore, this supply gap does not specifically represent a shortage of associate degree-prepared workers, but rather people to fill these positions in general.

Table 4 - Extrapolated Employment Demand versus Supply

<table>
<thead>
<tr>
<th></th>
<th>3YR Position Openings</th>
<th>3YR Supply/Demand Gap</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Employment</td>
<td>Employment in 3 Years</td>
<td>3YR Growth</td>
</tr>
<tr>
<td>588</td>
<td>672</td>
<td>+84 (14%)</td>
</tr>
<tr>
<td>3YR Growth</td>
<td>3YR Retirements</td>
<td>3YR Turnover</td>
</tr>
<tr>
<td>87 (14.8%)</td>
<td>55 (9.6%)</td>
<td>226</td>
</tr>
<tr>
<td>Total 3YR Openings</td>
<td>3YR Completions</td>
<td>3YR Shortage</td>
</tr>
<tr>
<td>226</td>
<td>18</td>
<td>(208)</td>
</tr>
<tr>
<td>Annual Shortage</td>
<td></td>
<td>(69)</td>
</tr>
</tbody>
</table>

Conclusions and Recommendations
Overall, the employment outlook for environmental engineering technicians 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, five firms indicated that they plan to hire for six new environmental engineering technician 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 environmental engineering technology.

³ National location quotient quantifies how “concentrated” an occupation is in a region by dividing the occupation’s share of total regional employment by its share of national employment. A LQ above 1.0 indicates higher than average concentration.
Conclusions

1. **The region is not producing enough of these types of technicians to fill the replacement or growth need projected through 2018.** Table 1 shows that survey takers are predicting approximately 55 position openings over the next 3 years due solely to replacements needed within their firms. Without extrapolating the data and without factoring in any growth, the region is still not producing enough graduates to fill the predicted number of replacement openings identified by survey completers. Until the region is able to increase the supply of associate degree-prepared workers to enter these jobs, employers will be forced to continue hiring individuals that may not have the level of educational preparation and experience they desire for employment at their firms.

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 handheld 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 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.

3. **The college may be better positioned to recruit students and place graduates if the Environmental Engineering Technology program was designed to focus more on Environmental Science with articulation to a bachelor’s degree.** Several of the environmental services and engineering firms interviewed suggested that Delaware Tech’s Environmental Engineering Technology program could more easily connect to a bachelor’s degree if the program shifted its focus to environmental science. The regional survey revealed that 16 of 42 firms have no preference when it comes to hiring a graduate of an environmental science program versus an environmental engineering technology program. Another 14 firms prefer to hire from an environmental science program. In addition, employer interviews found that many Class III and IV Water/Wastewater Operators are graduates of an environmental science program. Therefore, graduates of Delaware Tech’s 2YR degree program could continue their education to obtain their bachelor’s degree to help meet the need for Class III or IV Water/Wastewater Operators throughout the region.

4. **Employers in the region are cautiously optimistic about the growth and resurgence of environmental engineering technology jobs.** Survey data clearly shows that firms in the region are predicting growth of their workforce over the coming 3 years. Raw survey data shows an overall 3-year growth rate of roughly 15% for these jobs. Much of this growth they attribute to the slow, but steady, recovery of the economy and stricter regulatory requirements. This is good news for educational institutions that are faced with the opportunity to provide employers throughout the region with highly-skilled, experienced workers that not only meet their hiring requirements, but also their preferences for hire.

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. **Explore the possibility of transitioning the Environmental Engineering Technology program into an Environmental Science program.** Employers felt that environmental science is more highly recognized than environmental engineering technology. Therefore, this change may help recruit more students into the program. The majority of employers surveyed either do not distinguish between the two degrees or prefer to hire from an environmental science program. In addition, environmental science graduates are in demand for employment as both environmental technicians and Class III and IV water/wastewater operators throughout the region.

3. **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.

2. **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.

The full labor market scan available at [www.dtcc.edu/cirwa](http://www.dtcc.edu/cirwa) contains more generalized data for environmental engineering technology and other related occupations. Supplemental employment data for environmental engineering technicians 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.

For more information about CIRWA, please visit our website at:

www.dtcc.edu/cirwa

or contact:

Veronica S. Buckwalter, Director of CIRWA at:

100 Campus Drive
Dover, DE 19904
(302) 857-1599
v.buckwalter@dtcc.edu