Competency Model Development and Application to Meet Water Utility Workforce Needs
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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 resources, treatment, and distribution. Nearly 1,000 water utilities, consulting firms, and manufacturers in North America and abroad contribute subscription payments to support the Foundation’s work. Additional funding comes from collaborative partnerships with other national and international organizations and the U.S. federal government, allowing for resources to be leveraged, expertise to be shared, and broad-based knowledge to be developed and disseminated.

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.

Research results are disseminated through a number of channels, including reports, the Website, Webcasts, workshops, and periodicals.

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Competency Model Development and Application to Meet Water Utility Workforce Needs

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## CONTENTS

**TABLES** .................................................................................................................................... ix

**FIGURES** .................................................................................................................................... ix

**FOREWORD** .............................................................................................................................. xi

**ACKNOWLEDGMENTS** ........................................................................................................ xiii

**EXECUTIVE SUMMARY** ........................................................................................................ xv

**CHAPTER 1: PROJECT OVERVIEW AND APPROACH** .................................................... 1
  Introduction ..................................................................................................................... 1
  Why This Tool Is Needed ............................................................................................... 1
  Definitions of Key Concepts in Competency Modeling ................................................. 2
    What Is a Competency? ...................................................................................... 2
    What Does a Competency Model Include? ........................................................ 6
    What Is a Competency Glossary? ....................................................................... 7
  Approach Used in This Work ....................................................................................... 7
  The Project Approach ..................................................................................................... 8
    Step 1. Selecting Twelve Key Jobs for Competency Models ............................ 10
    Step 2. Developing Job Analysis Interview Guides ........................................... 13
    Step 3. Training the Interviewers ....................................................................... 14
    Step 4. Conducting Job Analysis Interviews ..................................................... 14
    Step 5. Analyzing the Interviews ....................................................................... 15
    Step 6. Developing Initial Competency Models ................................................... 16
    Step 7. Validating and Refining the Competency Models................................. 17

**CHAPTER 2: HOW COMPETENCY MODELS ARE DEVELOPED** .................................. 19
  Competency Model Use in the Water Field ............................................................... 19
  Water Sector Competency Model ........................................................................... 19
  Utility Use of Competency Models ........................................................................ 20
  Association of Board of Certification ................................................................. 25
  Why Organizations Have Developed Competency Models ................................. 25
  General Process for Developing Competency Models ............................................ 26
    Systematic Ways of Gathering Data for Development of a
      Competency Model ....................................................................................... 27
    Analysis and Integration of Data ......................................................................... 31
    Selection of Competencies for the Competency Model ..................................... 32
    Preparing the Competency Model Draft Documents ....................................... 33
    Reviewing and Revising the Competency Model With Stakeholders ............... 33
    Three Strategies for Developing Competency Modeling ................................... 33
      Single Job Competency Model ......................................................................... 34
      One Size Fits All Strategy ............................................................................... 34

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Multiple Competencies for Multiple Jobs Approach ................................................. 35
Combining the Three Strategies ........................................................................... 35

CHAPTER 3: ADAPTING ONE OF THE TWELVE COMPETENCY MODELS TO SIMILAR UTILITY JOB ................................................................. 37
Overview of This Process ................................................................................... 37
Planning and Preparing for the Resource Panel ............................................... 37
Holding the Resource Panel .............................................................................. 39
Collect Information Needed for a Competency Model From Resource Panel .... 39
Review and Agree on Changes to the General Competency Model That You Are Adapting ........................................................................ 40
Collect Information Needed for Job Description ............................................. 40
Post-Resource Panel Follow-Up Activities ...................................................... 41

CHAPTER 4: DEVELOPING A COMPETENCY MODEL FOR DIFFERENT UTILITY JOBS ................................................................................................................ 43
Overview of This Process ................................................................................... 43
Planning and Preparing for the Resource Panel ............................................... 43
Holding the Resource Panel .............................................................................. 44
Gather Information Needed for a Competency Model .................................... 45
Identify Content for the Competency Model .................................................. 46
Information Needed for Job Description .......................................................... 46
Post-Resource Panel Follow-Up Activities ...................................................... 47

CHAPTER 5: APPLICATIONS FOR COMPETENCY MODELS ............................................. 49
Personnel Development ...................................................................................... 49
Competency Assessment Tools ........................................................................ 49
Resource Guides .............................................................................................. 51
Development Planning Forms .......................................................................... 51
Structured Process for Competency Development ......................................... 51
Applying Competencies to Guide Personnel Selection .................................... 52
Structured, Behavior-Based Interviewing ......................................................... 53
Assessing Technical Competencies .................................................................. 53
Components of Competency-Based Selection Interviewing Application ....... 53
Competency Model Applications in Performance Management ................. 54
Identifying a Set of Competencies to Be Assessed .......................................... 54
Deciding Whether to Use Competencies in Performance Appraisal Ratings .... 54
Integrating Competencies With Other Parts of the Performance Management Process .................................................................................. 55
Components of Competency-Based Systems in Performance Management .... 55
Resistance to Changes in Performance Management Processes .................. 56
Other Applications of Competency Models ..................................................... 56
Curriculum Development ............................................................................... 56
Succession Planning ......................................................................................... 56
Competency-Based People Management Software ....................................... 57

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CHAPTER 6: USING COMPETENCY MODELS TO PLAN THE TRAINING AND DEVELOPMENT OF JOBHOLDERS .......................................................... 59
Introduction ..................................................................................................................... 59
Ways to Develop Competencies of Individual Jobholders ............................................. 59
  Formal Training Courses to Develop Competencies ................................................. 59
  Self-Development Using Professional Development Plans ..................................... 60
  Using Coaching to Develop Competencies ............................................................ 60
  Competency-Based Training and Development Approaches for Your Organization . 61
    Using a Competency Model as a Basis for Assessing Available Training .......... 61
    Creating a Training Plan for Jobholders ............................................................... 62
Creating a Professional Development Program for Your Organization ..................... 62
  Step 1. Select an Existing Resource Guide and Map It to the
    Competencies in the Job ................................................................................. 62
  Step 2. Prepare Instructions for Using a Copy of the Competency Model
    as a Crude Assessment Tool ....................................................................... 63
  Step 3. Prepare Instructions for the Overall Process of Professional
    Development Planning .................................................................................. 63
Professional Development Plan ....................................................................................... 65

CHAPTER 7: SUMMARY .............................................................................................. 67

APPENDIX A: COMPETENCY MODELS FOR TWELVE WATER INDUSTRY
  POSITIONS ..................................................................................................................... 69

APPENDIX B: COMPETENCY GLOSSARY ................................................................. 135

APPENDIX C: JOB DESCRIPTION TEMPLATE ........................................................... 165

APPENDIX D: COMPETENCY MODEL TEMPLATE ....................................................... 167

REFERENCES ................................................................................................................ 169

ABBREVIATIONS ......................................................................................................... 171
TABLES

1.1 Definition of performance levels ................................................................. 5
1.2 Performance levels for the example competency “Knowledge of market segmentation” ................................................................. 6
1.3 Responsibilities of positions targeted in this report ........................................ 10
2.1 Uses of competencies at American Water ...................................................... 23

FIGURES

ES.1 Process used to develop models................................................................. xvi
1.1 What determines the competencies for a job? .............................................. 4
1.2 Process used to develop competency models .............................................. 9
3.1 Planning steps for the resource panel.......................................................... 38
4.1 Planning steps for the resource panel.......................................................... 44
5.1 Sequence of events to follow in developing a professional management plan using competencies ................................................................. 52
7.1 Importance of competencies in job performance ......................................... 67
FOREWORD

The Water Research Foundation (Foundation) is a nonprofit corporation dedicated to the development and implementation of scientifically sound research designed to help drinking water utilities respond to regulatory requirements and address high-priority concerns. The Foundation’s research agenda is developed through a process of consultation with Foundation subscribers and other drinking water professionals. The Foundation’s Board of Trustees and other professional volunteers help prioritize and select research projects for funding based upon current and future industry needs, applicability, and past work. The Foundation sponsors research projects through the Focus Area, Emerging Opportunities, and Tailored Collaboration programs, as well as various joint research efforts with organizations such as the U.S. Environmental Protection Agency and the U.S. Bureau of Reclamation.

This publication is a result of a research project fully funded or funded in part by Foundation subscribers. The Foundation’s subscription program provides a cost-effective and collaborative method for funding research in the public interest. The research investment that underpins this report will intrinsically increase in value as the findings are applied in communities throughout the world. Foundation research projects are managed closely from their inception to the final report by the staff and a large cadre of volunteers who willingly contribute their time and expertise. The Foundation provides planning, management, and technical oversight and awards contracts to other institutions such as water utilities, universities, and engineering firms to conduct the research.

A broad spectrum of water supply issues is addressed by the Foundation's research agenda, including 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 a reliable supply of safe and affordable drinking water to consumers. The true benefits of the Foundation’s research are realized when the results are implemented at the utility level. The Foundation's staff and Board of Trustees are pleased to offer this publication as a contribution toward that end.

Roy L. Wolfe, Ph.D.  Robert C. Renner, P.E.
Chair, Board of Trustees  Executive Director
Water Research Foundation  Water Research Foundation
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Participation by the following utilities was instrumental in developing the models:

• Anne Arundel County Department of Public Works, Millersville, MD
• Aqua Pennsylvania, Inc., Bryn Mawr, PA
• City of Saint Louis, MO, Department of Public Utilities, St. Louis, MO
• Newport News Waterworks, Newport News, VA
• Northeast Ohio Regional Sewer District, Cleveland, OH
• Fairfax Water, Fairfax, VA
• Lake County Department of Utilities, Painesville, OH
• Southern Nevada Water Authority, Boulder City, NV
• Louisville Water Company, Louisville, KY
• Milwaukee Water Works, Milwaukee, WI
• San Francisco Public Utilities Commission, San Francisco, CA
• American Water, Voorhees, NJ
• Washington Aqueduct Dalecarlia Facility, Washington, DC
EXECUTIVE SUMMARY

This report describes the work conducted for the Water Research Foundation on “Competency Model Development and Application to Meet Water Utility Workforce Needs.” The focus of this report and accompanying Water Utility Workforce Needs Website is on applying competency modeling to improve job performance. Competency modeling involves analyzing a job to identify the skills and personal characteristics that drive superior performance in that job. These competencies are then incorporated into a model that describes the personal characteristics, attributes, and motivations that are needed to perform a job well. If the competencies of a position are known, then hiring, training, and retention procedures can be put into place that will help the utility develop the workforce it needs in the future.

This project developed competency models for twelve important positions in the water sector. Competency models have been used for many years in a number of other industries having technical job positions. It has been documented that use of the models in professional development often improves productivity. Their use, however, has been limited in the water profession.

Workforce development and retention in the water field has received a lot of interest in the past few years as it has become more difficult to find and keep competent staff for water industry jobs. One of the effective tools identified for these types of workforce issues is competency models. This project developed competency models for a number of representative, critical positions and described how they can be used to attract and retain competent workers.

The jobs chosen were those that the USEPA, the Department of Labor, and the Water Research Foundation had identified as being important in the day-to-day functioning of a water or wastewater utility and are also projected to have high levels of vacancies in the next decade (Manning et al. 2008 and Brueck et al. 2009).

The models were developed for:

• Water Treatment Plant Operator
• Distribution System Operator
• Process Control Specialist
• Water Operations Supervisor
• Facilities Maintenance Mechanic Technician
• Instrument Technician
• Distribution System Operations Supervisor
• Foreman/Crew Leader
• Water Quality Specialist
• Customer Service Representative (Office)
• Laboratory Technician
• Project Engineer

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The methodology used to develop these models was based on interviewing jobholders and their managers in utilities across the U.S. The interview questions were designed to allow the jobholder to discuss the competencies required to effectively perform the major responsibilities of the positions. The questions also encouraged the jobholders to discuss traits and characteristics that they have observed in superior performers (Figure ES-1).

![Figure ES.1 Process used to develop models](image)

Although each utility has different needs and requirements, the water profession lends itself to the development of core competencies in common job categories that utilities across the board can adapt to their specific needs. Competencies can be valuable to aid in directing training and development efforts and identifying individuals for promotion or appropriate job classifications.

This report includes the models developed for the twelve positions. It also includes a detailed description of the use and potential for competency models in personnel selection,
training and career development. Guidance is also provided on how to adapt and develop new competency models in a water utility.

The report is presented in two sections.

The first part includes:

- A description of how the work was done in this project. Chapter 1
- Background on the different ways that can be used to create competency models. Chapter 2

The second part is a “how to” guide for the utility person who wishes to:

- Adapt one of the models developed in this work for their own utility. Chapter 3
- Develop a competency model for a different job in their utility. Chapter 4
- Use competency models for a variety of purposes in a utility. Chapter 5
- Plan training and development of personnel using competency models. Chapter 6

The models themselves and the Competency Glossary are included in Appendices A and B.

The Water Utility Workforce Needs Website was developed to allows utility users to download these models, as well as the competency glossary, and other material from this report. An article in the August 2011 issue of the Journal of the American Water Works Association also provides an overview of this project and the models. (McTigue, N. and R. Mansfield, 2011.)
CHAPTER 1:
PROJECT OVERVIEW AND APPROACH

This chapter defines the concepts of “competencies” and “competency models.” It discusses how other industries use these models for attracting and retaining employees and suggests how they can be useful in the water field. The background and approach used by the project team to develop twelve models for the water field are discussed.

INTRODUCTION

Using competency models can create or enhance the ability of a workforce to meet the challenges of the water/wastewater industry in a more productive way than ever before. To help understand how this is possible, this chapter explains what these models are and how they can be used to attract, retain and train competent, and superior performing personnel.

Competency models provide a template or a guide for employers to use that clearly demonstrates the characteristics and traits that are needed for superior performance in a job. They can then select employees that possess these traits, and further can encourage employees to use the model as a guide to superior performance. The traits, or competencies, that define superior performance can often be learned and nurtured.

Competency models have been used for nearly 40 years. More than half of the Fortune 500 companies are using them, but their use has been limited in the water/wastewater field (Mansfield, 2005). This report presents the case that their use could greatly benefit this industry.

WHY THIS TOOL IS NEEDED

The water utility industry, like other U.S. industries, is facing a workforce crisis as the majority of Baby Boomers reach retirement age. Workforce studies have identified looming shortages of trained personnel for key job roles in the water utility industry, particularly engineers and operators. These shortages are more severe than in other industries due to the number and tenure of retirement age workers, along with recent pressure to maintain “lean” operations and staff. Utilities will all be forced to do more work with less people, each of whom must be chosen wisely (Brueck et al. 2009).

Water utilities are finding it difficult to attract and retain staff for key roles. The entry-level labor pool with the requisite skills has been shrinking, with fewer U.S. graduates earning technical and science degrees. It is becoming more difficult to retain younger workers, who are more ethnically diverse, carry different work-place values than their baby-boomer managers, and expect more flexible work place environments and management styles. In the water field, each existing employee lost through attrition or transfer produces a potential for success or disaster. The successful future of utilities in the U.S. will depend on the people who run them. Unfortunately, a “failure” at a water utility can have dire consequences to the public health of its consumers.
It is not only important to address demographic changes in the workforce and the deficit in required competencies (knowledge, skills, and personal characteristics needed) for job roles, but also to recognize that there will most likely be changes in the actual job roles themselves. Understanding the changing content and requirements of water utility job roles as technology advances will be essential to addressing this crisis. This requires that water utilities take a more strategic and systematic approach to workforce planning.

The focus of this report is on competency modeling: analyzing a job to identify the skills and personal characteristics that drive superior performance in a job, and then using those identified competencies to create a model for a job. If the competencies of a position are known, then hiring, training and retention procedures can be put into place that will help the utility have the workforce it needs in the future. If the competencies of a superior performer in a job are known, then these characteristics and traits can be sought in applicants and nurtured in jobholders.

Although each utility will have some specific needs and requirements, the water profession lends itself to the development of core competencies in common job categories that utilities across the board can adapt to their specific needs. Many utilities are constrained in hiring practices and may encounter roadblocks in implementing competencies in hiring. However, even for these utilities, competencies can be valuable to aid in directing training efforts and identification of individuals for promotion or appropriate job classifications.

A competency model is a set of competencies that lead to effective or superior performance in a job. Knowing the competencies for a job enables employers to select jobholders who already possess some of the competencies and are therefore more likely than other candidates to achieve effective or superior performance and to receive rewards and recognition that cause them to remain in the organization. Competency models can be used to provide training, coaching, and helpful feedback to employees, enabling them to improve their effectiveness in their current job and to develop skills that will advance their careers. Competency modeling can help water utilities to develop a more effective workforce and to attract and retain people whose competencies are a good fit for their jobs.

DEFINITIONS OF KEY CONCEPTS IN COMPETENCY MODELING

What Is a Competency?

Competency modeling has been used for over 40 years, and during that time, two different definitions have been used. One definition, consistent with the earlier use of the term in the field of education, holds that a competency is:

- An element of knowledge, skill or ability that is needed for effective performance of a job (definition 1)

Persons using this approach have often identified competencies by preparing a detailed analysis of the tasks performed by jobholders and identified skills and knowledge needed to
perform each task. This approach often leads to an extensive set of competencies identified for a job.

A different definition of a competency was developed around 1970 by the psychologist David McClelland and other staff at his consulting firm, McBer and Company (McClelland 1973). These researchers were interested in what factors account for superior, as opposed to just average performance in a job. They found that traditional selection criteria, such as aptitude tests, did not always predict superior performance. They instead determined that certain characteristics and traits, or competencies, were better indicators of effectiveness in a job. They defined a competency as:

- An underlying personal characteristic that leads to superior performance in a job (definition 2)

In addition to skills and knowledge, the personal characteristics comprising competencies were likely to include deeper aspects of personality, such as motives, traits, and self-image. McClelland and his colleagues downplayed the importance of skills and knowledge that are demonstrated by both superior and average performers and focused on characteristics that differentiated superior from average performers. Researchers using the second definition usually identify a smaller set of competencies for a job than do researchers using the first definition.

Further, some practitioners have decided to take elements from both definitions and define a competency as:

- A personal characteristic that contributes to effective or superior performance in a job (definition 3)

Any of these definitions of a competency can be useful, depending on one’s purpose. For example, for developing a technical training curriculum, using the first definition ensures that all of the skills and knowledge needed by technical professionals to perform tasks in one technical area will be developed. To select the best candidate from a set of qualified applicants, the second definition may be more useful.

Sometimes practitioners have found it helpful to distinguish between two types of competencies: competencies leading to superior performance (definition 2) and “threshold” competencies – ones that are needed for effective performance (definition 1) but do not contribute to superior performance. Figure 1.1 shows how the competencies for a job come from not only the job itself, but also from the person and the organization.
What Determines the Competencies for a Job?

Figure 1.1  What determines the competencies for a job?

Whichever general definition of a competency is used, it is helpful to provide a specific definition of each competency that is identified for jobholders. For example, here are two competencies with specific definitions:

- **Analytical Thinking:** Approaching a problem by using a logical, systematic, sequential approach
- **Fostering Innovation:** Developing or sponsoring the introduction of new and improved methods, products, procedures, or technologies

Practitioners have used various ways to describe the competencies that they identify, including behavioral indicators and competency levels as described below.

**Behavioral Indicators**

Besides providing a specific definition of each competency, it is helpful to further specify how the competency is demonstrated. One way to do this is to list some observable behaviors that provide evidence that a jobholder possesses a competency. For example, here are some behavioral indicators for the competency, “Analytical Thinking”:

- Makes a systematic comparison of two or more alternatives
- Notices discrepancies and inconsistencies in available information
• Identifies a set of features, parameters or considerations to take into account, in analyzing a situation or making a decision
• Approaches a complex task or problem by breaking it down into its component parts and considering each part in detail
• Weighs the costs, benefits, risks, and chances for success, in making a decision
• Identifies many possible causes for a problem
• Carefully weighs the priority of things to be done

Providing a set of behavioral indicators helps jobholders understand the competency and what they need to do to demonstrate it.

**Competency Levels**

Another way to specify a competency is to define a set of performance levels for it. Often, a set of general levels are identified, which can be applied to all of the competencies for a job. For example, Table 1.1 shows an example of general levels used in models. Table 1.2 shows how this set of levels further defines the example competency, “Knowledge of Market Segmentation.”

<table>
<thead>
<tr>
<th>Level</th>
<th>General Definition of Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic</td>
<td>Understands basic technical concepts in this area. Can perform a limited set of tasks with supervision and guidance.</td>
</tr>
<tr>
<td>Intermediate</td>
<td>Has some breadth or depth of understanding of concepts and principles in this area. Can perform a range of tasks and make standard decisions with light supervision.</td>
</tr>
<tr>
<td>Advanced</td>
<td>Has in-depth understanding of this area. Can perform all of the standard tasks in this area. Can trouble-shoot problems. Is seen as an expert who can provide solutions to the most challenging problems. Can teach others in this area.</td>
</tr>
</tbody>
</table>
Table 1.2

Performance levels for the example competency “Knowledge of Market Segmentation”

<table>
<thead>
<tr>
<th>Level</th>
<th>General Definition</th>
<th>Specific Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic</td>
<td>Understands basic technical concepts in this area. Can perform a limited set of tasks with supervision and guidance.</td>
<td>Understands market segments sufficiently to critique marketing communications in regard to suitability for discrete audiences.</td>
</tr>
<tr>
<td>Intermediate</td>
<td>Has some breadth or depth of understanding of concepts and principles in this area. Can perform a range of tasks and make standard decisions with light supervision.</td>
<td>Understands the division’s strategic vision and how products are positioned for near and far term. Understands role of the division’s products in external markets. Provides significant assistance in the development of a market segment.</td>
</tr>
<tr>
<td>Advanced</td>
<td>Has in-depth understanding of this area. Can perform all of the standard tasks in this area. Can trouble-shoot problems. Is seen as an expert who can provide solutions to the most challenging problems. Can teach others in this area.</td>
<td>Identifies and analyzes new market segmentations and chooses which to pursue.</td>
</tr>
</tbody>
</table>

Levels are especially useful for describing technical skills and knowledge. Using a consistent set of general levels for all competencies facilitates assessment of individuals, since the assessor needs to keep only one set of levels in mind. But it can also be useful to develop specific descriptions of each general level for each competency, as in Table 1.2, which uses the same general levels as before, but defines them for a specific competency – in this case, “Knowledge of Market Segmentation.”

What Does a Competency Model Include?

A competency model includes a set of competencies, usually specified by behavioral indicators or competency levels that describe skills and personal characteristics needed in a particular job or job family. Depending on which definition of a competency the practitioner is using, the competency model describes either effective or superior performance. When competencies are defined as characteristics needed for superior performance, the competency model is usually small: 8 to 14 competencies. When competencies are defined as characteristics needed for effective performance, the competency model is often larger, with 20 or more competencies.

A competency model is usually a multi-page document that may include components such as:
Chapter 1: Introduction and Overview

• An outline or graphic in which the competencies are grouped into several conceptually related clusters
• A detailed description of each competency, which might include a specific definition, a set of behavioral indicators, or specific definitions of general levels for each competency
• A table linking the competencies to major job responsibilities or tasks

What Is a Competency Glossary?

When an organization is developing competency models for many different jobs, it is often helpful to first identify a set of competencies from which all of the competency models will be constructed. Competency glossaries often include (a) a set of non-technical competencies potentially applicable to both individual contributor and managerial positions, (b) a set of managerial competencies only applicable to managerial positions, and (c) several sets of technical competencies, each applicable to a different functional area (e.g., engineering, finance, maintenance, sales, information technology). The non-technical competencies are often obtained or adapted from a set provided by a specialist who works in competency modeling, while the technical competencies can be developed through discussions with subject matter experts within the company.

Each competency within a competency glossary has a general definition and may also include a set of behavioral indicators illustrating different ways by which the competency is demonstrated or descriptions of a set of competency levels – for example, descriptions of what performance is expected at Basic, Intermediate and Advanced levels of the competency.

When a competency glossary is being used, the task of developing a competency model for a specific job becomes one of deciding which of the competencies in the glossary should be included in the competency model and of defining how each competency needs to be demonstrated in this job. Using a competency glossary ensures that the organization is using a common conceptual framework to describe competencies across jobs. Competency glossaries are needed when an organization plans to use competency models for jobs and manage individuals using competency management software. A competency glossary for water utility positions is provided in Appendix B.

APPREACH USED IN THIS WORK

This report documents how the work for the Water Research Foundation project, “Competency Model Development and Application to Meet Water Utility Workforce Needs” was conducted and includes twelve models and the glossary of competencies. The report also provides “how-to” information on using, adapting and creating new models.

The model development was based on the approach generated by David McClelland, which focuses on analyzing the approach to difficult or challenging situations by superior performers. McClelland believed that only outstanding performers could provide insight into what is important in doing a job well. While traditional job analysis describes tasks and skills
needed to perform those tasks, the models developed in this work focus on outstanding performance.

The approach to our work was to interview several utility managers who have experience in hiring staff and training them. The managers identified their successful performers and their supervisors in each job category, and those individuals were interviewed. In this way, the core competencies and eventually the competency models were developed. The jobholders were also asked to describe their reaction to and actions during a challenging situation. In this manner, the competencies needed for superior performance were identified.

There are a number of acceptable methodologies that can be used to develop competency models and to identify the competencies for a particular job. In this project, the methodology was based on interviewing superior performers and analyzing the responses to open ended questions. Job Analysis Interviews were conducted with job holders and their managers. The following considerations were important in the development of the twelve competency models in this project:

• The best sources of information about the competencies required for a job are jobholders and managers of jobholders.
• Water utilities vary in the way they configure job roles across the industry. Given the variation within job roles in the water utility industry, it was not feasible for this project to develop a competency model for every job role at each and every water utility.
• For the competency models to have credibility, they must be based on data gathered from a variety of different water utilities to eliminate the possibility of utility specific conditions.
• Job Analysis Interviews, involving jobholders and the managers of jobholders, are a proven way to gather information to build competency models as described in this report. They are conducted with superior performing jobholders and also with the managers of these jobholders. These interviews are used to identify the four or five most important responsibilities that the jobholder is responsible for doing or ensuring and also to identify the key tasks, formal or informal performance measures, and the skills and knowledge needed to perform this responsibility.
• Information gathered this way enables the development of competencies for job roles which are specific enough, yet span the variation among job roles across water utilities, and can then be used as a foundation for designing staffing and development applications for the industry.

THE PROJECT APPROACH

The research process is shown schematically in Figure 1.2.
The research process utilized these steps to identify competencies and develop competency models for twelve jobs in the water field:

- Step 1. Selection of Twelve Key Jobs for Competency Models
- Step 2. Developing Job Analysis Interview Guides

Figure 1.2 Process used to develop competency models
- Step 3. Training the Interviewers
- Step 4. Conducting Job Analysis Interviews
- Step 5. Analyzing the Interviews
- Step 6. Developing Initial Competency Models
- Step 7. Validating and Refining the Competency Models

**Step 1. Selecting Twelve Key Jobs for Competency Models**

The research plan for the project called for identifying twelve broadly-defined jobs for which competency models would be useful in water industry workforce planning and development. The intent of this work was to identify jobs present in most water utilities and for which significant numbers of employees will need to be hired and trained over the next decade. The jobs identified for development of a competency model for the project were:

- Water Treatment Plant Operator
- Distribution System Operator
- Process Control Specialist
- Water Operations Supervisor
- Facilities Maintenance Mechanic Technician
- Instrument Technician
- Distribution System Operations Supervisor
- Foreman/Crew Leader
- Water Quality Specialist
- Customer Service Representative (Office)
- Laboratory Technician
- Project Engineer

The positions and their main responsibilities are shown in Table 1.3. Four or more main responsibilities for each of these positions were identified based on the results of interviews with job holders and managers. Although many of these jobholders have more than those responsibilities listed here, typically these main responsibilities are common in jobholders in various water treatment facilities. Note that each of these jobs is a generic role and that there is some variation among water facilities in the way these jobs are named and in the way their responsibilities are configured.

<table>
<thead>
<tr>
<th>Position</th>
<th>Responsibilities for the job</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Treatment Plant Operator</td>
<td>1. Monitor, evaluate and adjust treatment process</td>
</tr>
<tr>
<td></td>
<td>2. Conduct process control lab analyses</td>
</tr>
<tr>
<td></td>
<td>3. Assure compliance with regulations</td>
</tr>
<tr>
<td></td>
<td>4. Maintain and operate filters and equipment including minor maintenance</td>
</tr>
</tbody>
</table>

(continued)
<table>
<thead>
<tr>
<th>Position</th>
<th>Responsibilities for the job</th>
</tr>
</thead>
</table>
| **Distribution System Operator**           | 1. Oversee equipment (pipes, hydrants, valves, etc.) repair, replacement and rehab  
2. Monitor, evaluate and adjust disinfection and collect water quality samples  
3. Flush mains and hydrants as required  
4. Respond to and resolve customer complaints and maintain good customer relations. (On-site in the field as the situation requires but not in the capacity of a full-time customer service representative)                                                                                                                                                                                                                                                                                                                                 |
| **Process Control Specialist**              | 1. Write or modify SCADA programming  
2. Troubleshoot operational problems possibly related to SCADA software/programming  
3. Document logic and coding for all new or changed programming  
4. Provide data as needed to operations and to other personnel as requested                                                                                                                                                                                                                                                                                                                                                       |
| **Water Operations Supervisor**             | 1. Oversee all water treatment plant operations and maintenance  
2. Prioritize and make work assignments  
3. Ensure regulatory compliance  
4. Address or resolve, where possible, employee work-related issues  
5. Implement policies set forth by upper management or policy bodies  
6. Oversee quality control and continuous improvement                                                                                                                                                                                                                                                                                                                                                                           |
| **Facilities Maintenance Mechanic Technician** | 1. Perform routine maintenance on mechanical system components in coordination with operations staff, and repair or install new mechanical system components  
2. Record/document activities in work order maintenance management system, etc.  
3. Coordinate functions with operational staff to assure that activities do not conflict with planned operational needs  
4. Maintain inventory of critical parts/supplies to avoid interruption of operations                                                                                                                                                                                                                                                                                                                                                         |
<table>
<thead>
<tr>
<th>Position</th>
<th>Responsibilities for the job</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Instrument Technician</strong></td>
<td>1. Perform required QC/maintenance for on-line instrumentation</td>
</tr>
<tr>
<td></td>
<td>2. Troubleshoot communications and instrumentation problems</td>
</tr>
<tr>
<td></td>
<td>3. Requisition/purchase new or replacement equipment</td>
</tr>
<tr>
<td></td>
<td>4. Coordinate with work by outside contractors, consultants, etc.</td>
</tr>
<tr>
<td><strong>Operations Supervisor (Distribution)</strong></td>
<td>1. Oversees crews that maintain valves, fire hydrants, pipes and services</td>
</tr>
<tr>
<td></td>
<td>2. Addresses and resolves employee issue</td>
</tr>
<tr>
<td></td>
<td>3. Oversees contractors working on the distribution system</td>
</tr>
<tr>
<td></td>
<td>4. Oversees quality control and continuous improvement</td>
</tr>
<tr>
<td></td>
<td>5. Reviews project designs for compliance with engineering principles, contract plans, scope, and specifications</td>
</tr>
<tr>
<td><strong>Foreman / Crew Leader</strong></td>
<td>1. Manages and oversees the crews responsible for completion of repairs in the distribution system</td>
</tr>
<tr>
<td></td>
<td>2. Ensures the safety of the crew and the public</td>
</tr>
<tr>
<td></td>
<td>3. Oversees the completion of preventative maintenance tasks</td>
</tr>
<tr>
<td></td>
<td>4. Creates permanent asset records of construction</td>
</tr>
<tr>
<td><strong>Water Quality Specialist</strong></td>
<td>1. Ensures that the facility maintains compliance with all requirements of the Safe Drinking Water Act</td>
</tr>
<tr>
<td></td>
<td>2. Ensures that laboratory maintains certification with the State</td>
</tr>
<tr>
<td></td>
<td>3. Responds to and resolves, where possible, water quality complaints</td>
</tr>
<tr>
<td></td>
<td>4. Provides support on water quality issues to production and management staff</td>
</tr>
<tr>
<td><strong>Customer Service Representative (Office)</strong></td>
<td>1. Responds to and resolves where possible customer complaints regarding water usage (high/low), and helps customers interpret their water bills</td>
</tr>
<tr>
<td></td>
<td>2. Explains policies and procedures related to billing and collections</td>
</tr>
<tr>
<td></td>
<td>3. Refers customers with concerns about water quality, conservation, etc., to other departments</td>
</tr>
<tr>
<td></td>
<td>4. Starts new service or ends service when customers are moving</td>
</tr>
</tbody>
</table>

(continued)
### Table 1.3 (continued)

<table>
<thead>
<tr>
<th>Position</th>
<th>Responsibilities for the job</th>
</tr>
</thead>
</table>
| **Laboratory Technician** | 1. Prepares water, chemical and sludge samples for analysis of microbiological and chemical constituents  
                             2. Analyze samples using appropriate instruments and equipment and interpret results  
                             3. Performs testing and procedures required to maintain quality assurance/quality control  
                             4. Maintains all laboratory records as stipulated in the lab’s Operating Procedure |
| **Project Engineer**  | 1. Makes recommendations for water system repairs and upgrades and prepares request for proposals for these projects  
                             2. Defines the project philosophy, activities, milestones, and staff requirements of projects  
                             3. Provides project management for projects related to the provision, treatment, transmission, and protection of public drinking water supplies performed by contractors  
                             4. Reviews project designs for compliance with engineering principles, contract plans, scope and specifications. |

### Step 2. Developing Job Analysis Interview Guides

A standard job analysis interview guide with a consistent set of questions and a procedure for recording interviewees’ responses in a systematic way during the interviews was developed. Each interview presented a standard set of questions about each of the pre-identified main responsibilities for the job and some additional questions about important, additional main responsibilities identified by the interviewees. Both jobholders and managers of jobholders in each of the key jobs were interviewed and some questions were planned only for managers of jobholders. For each of the pre-identified main responsibilities for the job the following questions were asked:

- Is this an important responsibility in the job in this organization?
- What are some of the key tasks that someone in the job needs to do as part of this responsibility?
- What do you think are the most effective approaches for carrying out this main responsibility?
- What is the most challenging situation that a jobholder encounters as part of this main responsibility?
- What do you think is the most effective way to deal with this challenging situation?
• What technical knowledge and skills, if any, are needed to carry out this main responsibility?
• What non-technical skills, if any, are needed to carry out this main responsibility?

After asking these questions about each of the four main responsibilities, the interviewer asked these questions:

• Is there another important responsibility for the job that I have not asked you about? If so, what is it?
• What are some of the key tasks that someone in the job needs to perform as part of this responsibility?
• What technical knowledge and skills, if any, are needed to carry out this responsibility?
• What non-technical skills, if any, are needed to carry out this responsibility?
• (For managers of jobholders only) Think of some superior performers that you have managed in this job. What skills or personal characteristics did these people demonstrate that might explain their superior performance?

An interview guide for conducting these interviews and recording data from them was prepared in Microsoft Excel. The interviewer first entered background information about the interview: facility name, job, interviewee’s role (jobholder or manager of jobholders). Based on the initial responses, the template generated the appropriate set of questions depending on the job and whether the interviewee was a jobholder or manager of jobholders. The guide included designated cells for entering notes on the interviewee’s response to each question; during the interview the interviewer would ask each question and enter notes on the interviewee’s response in the column next to the one containing the question. The interview template can be found at www.eetinc.com/competency.

Step 3. Training the Interviewers

In a day-long workshop, the research team comprised of human resources experts and water industry experts, met to review the interview template, standardize the procedures used to conduct the interviews, and to review how to record interviewees’ responses. On the day after the workshop, the interview trainers and trainees visited a local water facility and conducted several interviews jointly. After each interview, the trainers provided feedback and coaching to the trainees about their interviewing.

Step 4. Conducting Job Analysis Interviews

After the interview training workshop, interviews were scheduled and conducted at several utilities in different parts of the country:

• American Water, Mt. Laurel, New Jersey
• Anne Arundel County Department of Public Works, Millersville, MD
• Aqua Pennsylvania, Inc., Bryn Mawr, PA
• City of Saint Louis, Department of Public Utilities, St. Louis, Missouri
• Delaware River Regional WTP, New Jersey American, Delran, New Jersey
• Fairfax Water, Fairfax, Virginia
• Lake County Department of Utilities, Painesville, Ohio
• Louisville Water Company, Louisville, Kentucky
• Milwaukee Water Works, Milwaukee, Wisconsin
• Newport News Waterworks, Newport News, Virginia
• Northeast Ohio Regional Sewer District, Cleveland, Ohio
• San Francisco Public Utilities Commission, San Francisco, California
• Southern Nevada Water Authority, Boulder City, Nevada
• Virginia American, Hopewell, Virginia
• Washington Aqueduct Dalecarlia Facility, Washington DC

Over 200 interviews were conducted: anywhere from 10 to 19 per job. More interviews were conducted with jobholders than with managers of jobholders.

Step 5. Analyzing the Interviews

After conducting each interview and capturing notes on a laptop computer during the interview, the interviewer reviewed and edited his or her notes and renamed and saved the interview template file. For the analysis, data from the completed interview template files were transferred into a database, which was sorted by job. All the interviews for each of the jobs were separately analyzed.

The interview responses were then analyzed. Since the interviews contained only qualitative data (responses to open-ended comment questions), a process of thematic analysis was used. For each question about a job, the analyst read all the responses several times and identified themes: ideas mentioned in two or more interviews.

A separate thematic analysis was conducted on the data for each of the six jobs. For each job an Excel spreadsheet was designed so that the data for all interviews about the job could be examined separately for each of the 35 - 42 questions used in the interview. The analyst read all of the responses to a question (occurring in one column of the spreadsheet) and noted themes mentioned by two or more interviewees in a designated cell, directly below the interview responses for that question.

The next step was to review the themes identified in the interviews for each job and to identify a draft set of competencies for that job. Some potential competencies can be directly identified from interviewees’ suggestions about the technical and non-technical skills needed to perform each of the job’s main responsibilities. Other potential competencies can be inferred from responses to questions such as one about challenges encountered in performing a main responsibility and the most effective approaches for dealing with these challenges.

In identifying the draft set of competencies for a job, an architecture with four categories of competencies was chosen: Foundational, Technical, Non-Technical and Competencies for Superior Performance. The first category, Foundational Competencies, are ones that are assumed to have been developed prior to entry into the job – in school or in previous jobs – and
for which jobholders are not offered training. Examples include reading, writing, speaking, and general science knowledge. Foundational Competencies are essential to the effective performance of any of the job’s main responsibilities, but are assumed to be present before entering the job. Foundational competencies may be technical (e.g., “Basic Computer Skills”) or non-technical (e.g., “Following Directions”).

The second type of competencies in the architecture, Technical Competencies, requires knowledge and skill of a technical nature that is usually developed through training for the job or on the job. Technical Competencies are central to the performance of one or more of the job’s main responsibilities. An example of a technical competency is “knowledge of process logic controllers” for the job of Instrument Technician.

The third type of competencies in the architecture, Non-Technical Competencies, are non-technical ones that may not be present and fully developed on entry into the job and which are necessary for effective performance of one or more main responsibilities. For example, “Conscientiousness” might be a Non-Technical Competency for a Treatment Plant Operator because effective performance depends on performing tests and operations regularly, consistently, and in a precise way.

Competencies for Superior Performance are taken from the first three categories. A template of the model used in this work can be found in Appendix D.

**Step 6. Developing Initial Competency Models**

Through the structure of the competency models, a clear focus is provided on the competencies most important to effective performance of the most important responsibilities of the job. In the competency models, these most important competencies appear in the main section of the competency model, describing the competencies for the job. The models also acknowledge the importance of other, less important competencies, including ones that most jobholders would have already developed before entry into the job, in earlier educational experiences and in earlier jobs. In the competency models that were developed here, these additional competencies appear as a separate set of competencies that we call, Foundational Competencies.

Both the main set of competencies for a job and the additional foundational ones are subdivided into Technical and Non-Technical sections.

Within the competency models competencies are described differently, depending on whether they are technical or non-technical and on whether a competency appears in the main section of the competency model or as one of the additional, foundational ones. Technical competencies all involve the ability to apply technical knowledge when making decisions, performing technical operations, or diagnosing and solving technical problems. Technical competencies are defined by specifying the sub-areas in which these abilities must be demonstrated.
Non-technical competencies are skills, traits or other personal characteristics that facilitate effective performance of main job responsibilities. Non-technical competencies are defined in these competency models by specifying the observable behaviors by which they are demonstrated and which lead to effective performance.

**Competencies for Superior Performance**

Practitioners in the area of competency modeling differ about whether competency models should include all the skills needed for effective performance or should focus on a subset of these skills that contribute to superior performance. The competency models developed here are meant to be comprehensive, by including all the competencies needed for effective performance, and to also identify in a separate section the subset of competencies that are most likely to contribute to superior performance.

**Drawing on the Water Sector Competency Model**

In 2009, a Water Sector Competency Model was published on-line:


This model was prepared through a collaborative effort between the American Water Works Association, the Water Environment Federation, and the U. S. Environmental Protection Agency. The framework for the model was provided by the Employment and Training Administration of the U.S. Department of Labor. This competency model is a glossary of competencies relevant to many jobs in the water industry. The competencies are grouped into five tiers, or levels. Most of the competencies in this glossary are non-technical, although there are several very broadly defined technical competencies, such as “Facilities Operations and Maintenance” and “Utility Field Operations.” Since the Water Sector Competency Model represents a significant and visible contribution to competency work in the industry, the models developed in this work drew on this model whenever possible. Therefore, some competency names and parts of their behavioral descriptions are included in these competency models.

**Step 7. Validating and Refining the Competency Models**

The draft competency models based on the analysis of the interviews were reviewed and refined by other members of the project team, including staff with extensive experience in the water industry. One result of this review was to develop more detailed descriptions of technical competencies, especially by specifying their most important sub-areas.

Although the initial interviews were conducted and analyzed in a systematic way, many of the themes from the analysis were mentioned by only a few of the interviewees. It was unclear, when constructing a competency model, whether to include competencies implied by themes with limited evidence from the interviews. Therefore, a second round of interviews was conducted to review the draft competency models with jobholders and managers of jobholders and ask what additions and modifications might be needed.
An interview guide was developed for these interviews, but each interview mainly involved reviewing one of the draft competency models with a jobholder or a manager of jobholders and asking about needed additions and modifications.

The same interviewers who conducted the initial Job Analysis Interviews conducted the second round of interviews. For each job several jobholders and managers of jobholders were interviewed. Interviewees from the original Job Analysis interviews were re-interviewed, along with interviews at two additional water facilities.

Much of the focus of the second round of interviews was on the technical competencies to ensure that the list was complete and that the important sub-areas of each technical competency were identified. The interviewers, both of whom had extensive experience in the water industry, revised the twelve competency models again, based on the interviews.

The first six competency models that were developed were presented to the Project Advisory Committee and water utility participants at a workshop to review the project’s work and identify the most effective ways to promote the adoption of the work within the industry. Based on feedback from this group, the competency models were revised. Among the key revisions was a general re-conceptualization of the technical competencies to emphasize behavioral application of knowledge. In addition, within each competency model, the competencies thought to drive superior performance were highlighted in a separate section, in addition to their inclusion in the main section presenting the competencies for the job.

An additional six competency models were subsequently developed using the same process as the first six. The twelve competency models developed through this work are included in Appendix A. A competency glossary developed for these positions is included in Appendix B.
CHAPTER 2:
HOW COMPETENCY MODELS ARE DEVELOPED AND USED

This chapter presents some illustrations of application of competency models by water utilities. It then provides a practical methodology for developing competency models for most jobs. Chapters 3 and 4 provide guidance on how to take the twelve competency models developed for this project and adapt them for similar utility jobs or different jobs.

COMPETENCY MODEL USE IN THE WATER FIELD

Water Sector Competency Model

In 2009, the Water Sector Competency Model was created by a workforce strategy group with wide representation in the water industry. The broad purpose was to address future staffing needs in the water industry, based on the high rates of projected retirement of existing personnel. The specific goal was to develop a product in the public domain that could be used by local workforce development centers to help guide people with appropriate skills into available opportunities in the water industry (www.careeronestop.org).

Members of the workforce strategy group gathered available information about jobs and interviewed subject matter experts. They devoted significant effort to analyzing the tasks associated with different water industry jobs. The group distilled the information into competency definitions that would apply across states and across different areas within the water industry. They also coordinated with the US Department of Labor and the EPA to ensure that the structure of the final model would be in a form acceptable to the US Department of Labor. A consultant assisted in the process, especially in formulating personal effectiveness skills.

The model can be found at:


The structure of the model is a pyramid. The entire set of competencies in the pyramid structure can be used as a set of building blocks to construct a competency model for any job in the water industry. Each tier of the pyramid represents a set of competencies of a different type. The Tiers include:

1. Personal Effectiveness Competencies
2. Academic Competencies
3. Workplace Competencies
4. Industry-wide Technical Competencies
5. Water Sector Technical Competencies
6. Occupation-Specific Knowledge Areas
7. Occupation-Specific Technical Competencies
8. Occupation-Specific Requirements
9. Management Competencies
Utility Use of Competency Models

In addition to the Water Sector Competency Model described above, some utilities report the use of competency modeling in some form. Individuals at four water organizations were interviewed as part of this project to establish what types of models and what types of applications are being used at their utilities. The organizations interviewed included:

- San Francisco Public Utilities Commission (SFPUC), California
- Louisville Water Company, Kentucky
- American Water, Voorhees, New Jersey
- Anne Arundel County Department of Public Works, Maryland

Probably because of the small number of cases studied there were relatively few themes identified in all four. Instead, each of these utilities used a model that was best suited to their needs. They varied in a number of ways, including the reasons for embarking on competency modeling, in the data gathering approaches, in the types of competency models generated, and in the way the models have been applied. This variety is not surprising; it mirrors the variety in the way competency modeling has been conducted outside of the water industry, over the past three decades. Some of the specific models developed by utilities are described below.

San Francisco Public Utilities Commission

The SFPUC released its “Five Year Strategic Plan for Workforce Operations” in February 2012. Recognizing that the SFPUC benefited for years from a stable experienced workforce, both Baby Boomer retirements and changing facilities, regulations, and equipment have modified that picture. This Strategic Plan was developed to ensure that the SFPUC will have sufficient staffing in mission critical categories and employees who are prepared to do quality work.

One of the tasks identified by this strategic work plan is to analyze and document competencies and knowledge needed for successful performance of work. The rationale and the components of this task are taken from SFPUC’s strategic plan below:

<table>
<thead>
<tr>
<th>WHY is this program component needed?</th>
</tr>
</thead>
<tbody>
<tr>
<td>A thorough, methodical analysis of both the technical and non-technical knowledge and skills required to reliably perform mission-critical work is necessary as a basis for building appropriate outreach materials, working with stakeholders to build qualified candidates, constructing navigable career paths for both internal and external candidates, and tailoring recruitment efforts to the organization’s specific needs. Identification of critical tasks and the information needed to perform these tasks is also critical to defining the training tools and knowledge management systems needed in order to move current employees into new work areas.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>WHAT is the program component?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>
Under the Assignment-Specific Competency Analysis initiative, the knowledge required for staff in each mission-critical job category to competently perform their work will be examined. This initiative will seek to use the required competencies to develop both internal and external candidates for mission-critical jobs. The competency analysis will help us provide helpful consultation to external candidate development programs (such as high schools, unions, community colleges, and universities), as well as guide our efforts in developing training material for cross-training and development of internal candidates.

**HOW will it be implemented?**

Interviews will be conducted with SFPUC staff to determine the skills and knowledge required for each classification examined. This analysis will help determine the required skill level for both internal and external candidate development for that position, and will help illuminate what trainings need to be prioritized for mission-critical job categories.

More research will also be done into credentialing requirements and what certifications are required for the mission-critical classifications at different levels. (SFPUC, February 2012.)

**Louisville Water Company Models**

The Louisville Water Company (LWC) has developed competencies that are used in job descriptions. Each competency is constructed by aggregating competencies from several competency families. LWC Executives, Directors, and Managers are evaluated on thirteen Management Competencies as part of their year-end review. Supervisors are evaluated on four to six Management Competencies that are selected and agreed upon between the Supervisor and his/her Manager at the beginning of the year. The four to six competencies are selected from the same list of Management Competencies. Each competency is described through five factors, with each factor receiving a rating. Competencies account for 30 percent and performance goals account for 70 percent of the overall year-end rating.

The thirteen Management Competencies are:

- Achievement Focus
- Business Ethics
- Change Management
- Communications
- Diversity Leadership
- Managing Customer Focus
- Managing People
- Organizational Savvy
- Planning & Organization
- Self-Management
- Strategic Thinking
- Team Leadership
- Visionary Leadership
When the LWC Strategic Plan is reviewed and updated, the management competencies identified to achieve the strategic objectives are reviewed and compared to the current list in use. If new competencies need to be added and outdated competencies need to be removed, it is done so at this time.

Non-management employees are evaluated on 4 to 6 competencies that are selected from a list of thirteen Employee Competencies. The competencies selected are agreed upon between the employee and his/her supervisor/manager at the beginning of the year. The same weight distribution applies for employees (30 percent for competencies and 70 percent for performance goals). The Employee Competencies are also broken down into five factors for each competency.

The thirteen Employee Competencies are:

- Achievement Focus
- Communications
- Continuous Learning
- Cooperation
- Collaboration and Flexibility
- Customer Service
- Dependability
- Diversity Awareness
- Initiative
- Job Knowledge
- Planning & Organization
- Problem Solving
- Teamwork

The year-end evaluation of competencies for both managers and employees includes a numerical rating for each factor of the competency along with managerial comments and examples of how the competencies were demonstrated during the year. All employees (managers and non-managers) are required to provide their own evaluations and comments for each competency that is sent to the “reviewing manager” for consideration of the final year-end rating. The manager conducting the formal year-end review may choose to agree with the rating and comments provided by the employee, or may choose a different rating.

American Water

American Water began evaluating the use of competencies in 2012 to help translate employee capability into effective outcomes at the company. American Water is an investor-owned company that with its subsidiaries operates nearly 100 treatment facilities across the United States.

According to Suzann Boylan, VP of Human Resources, “American Water clearly understands the cause and effect relationship between the capability of its people and the value delivered to its customers. It’s for this reason that we are developing and using competency
models better known as my Success Drivers at American Water as part of the framework to articulate the organization’s capability requirements.” Ms. Boylan believes that if you want people to deliver effective outcomes and results you have to understand which behaviors will move the dial and which ones won’t.

Competency models do that by emphasizing what’s important, specifically by identifying and defining the combination of strategically significant knowledge, skills, abilities, and other characteristics needed for superior performance in a job. Once developed, they also enable an organization to develop capability through the alignment of internal processes and systems. “When you know what you want (desired results) and what you need (desired behaviors) to achieve those results, the next step is to align Human Resources’ and any other organizational process and system to develop, support and reinforce these behaviors. Simply put, it’s about continually building and sustaining the right organizational capability through the synergy of process and resource alignment.”

Table 2.1 below outlines several ways American Water will be building employee capability through the use and alignment of competency models.

<table>
<thead>
<tr>
<th>Table 2.1 Uses of competencies at American Water</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recruiting and Hiring: Develop hiring criteria and protocol based on competencies; conduct structured interviews based on competency models for all employees.</td>
</tr>
<tr>
<td>Training and Development Planning: Train employees by creating courses/curriculum aimed at the development of certain competencies. Initiate forward looking discussions involving competency strengths, weaknesses and development. Map development activities to leadership competencies (includes formal training, employee movement and work assignments)</td>
</tr>
<tr>
<td>Assessment: Incorporate competencies into assessments for both development and evaluation.</td>
</tr>
<tr>
<td>Performance Management: Link competencies to results and rewards (and collective bargaining agreements if applicable)</td>
</tr>
<tr>
<td>Succession Planning: Identify and evaluate successors against leadership competencies and link promotion readiness to competencies</td>
</tr>
<tr>
<td>Compensation: Use competency models to structure pay differences between jobs or to evaluate employees for pay increases.</td>
</tr>
<tr>
<td>Knowledge Retention: Manage retention of critical skills through the identification and measurement of competencies tied to current and future organizational objectives</td>
</tr>
<tr>
<td>Change Management: Support organizational change efforts through broad systematic support of future-orientated competencies</td>
</tr>
</tbody>
</table>

American Water managers believe that competency models can benefit their company on three levels – by improving the structure of the organization, by providing guidelines for
managers and by helping employees develop those competencies that will lead to superior performance. Specifically, these benefits are as follows:

**Organizationally:**
- Provide a common framework and language for discussing how to implement and communicate key strategies
- Provide a common understanding of the scope and requirements of a specific role/job
- Provide common, organization-wide standards for career levels that enable employees to move across business boundaries.
- Reinforce corporate strategy, culture and vision
- Establish expectations for superior performance, resulting in a systematic approach to professional development
- Increased effectiveness of training and professional development programs by linking them to success criteria (i.e. behavioral standards of superior performance)

**Managers of People:**
- Clarify standards of superior performance for easier communication of expectations with direct reports.
- Provide a clear foundation for dialogue to occur between managers and employees about performance, development and career related issues.
- Identify criteria to improve the accuracy and ease of the hiring and selection process.
- Provide objective performance standards

**Employees:**
- Provide development tools and methods for enhancing their skills
- Provide the basis for a more objective dialogue with their manager or team about performance, development and career related issues
- Identify success criteria (e.g., behavioral standards for superior performance) required to be successful in their role
- Support a specific and objective assessment of their strengths and specify targeted areas for professional development

**Anne Arundel County, Department of Public Works Approach**

Anne Arundel County, Department of Public Works, Maryland, uses competencies in their Flexible Worker Program. This program provides employees with a process by which they can acquire new skills that have been identified as competencies required by positions in the organization. The program is a step-by-step process for learning new information and practicing new skills. A Personal Qualification Standards (PQS) provides specific information about the requirements and standards for each position. Workers are encouraged to perform a self-assessment using the Qualification Standards as a guide and then work with a manager to identify training and coaching that will lead to mastery of these competencies.
Association of Boards of Certification

The Association of Boards of Certification (ABC) offers a voluntary certification program to water and wastewater operators. ABC serves as a technical resource for certification entities. ABC uses detailed analyses of the technical skill/knowledge requirements for various jobs in the water industry. The foundation for this type of analysis is usually a task analysis. A few main groups of tasks are identified, and each of these is broken down into subtasks. The subtasks eventually correspond to skill areas, so that each skill is defined as the knowledge or skill required to perform a specific set of tasks. This approach typically uses a large number of fairly narrowly defined skill/knowledge areas (Association of Boards of Certifications 2007).

ABC used this approach to identify skill/knowledge requirements for several operator jobs in the water industry:

- Water Treatment Operator
- Wastewater Treatment Operator
- Water Distribution Operator
- Very Small Water System Operator

To understand the approach, consider how it was applied for the Water Treatment Operator job, for which four different classes (job levels) were identified. First, a task analysis was conducted, and jobholders were asked to rate the frequency of performing each task and the consequences of incorrect performance. From the ratings, the most important tasks were identified and presented in a hierarchical format, with main tasks broken down into sub-tasks. For example, one of the main tasks, “Monitor, Evaluate and Adjust Treatment Processes,” has several sub-tasks, one of which is “Source Water Treatment.” This sub-task entails several “core competency” areas, one of which is “Algae Control.” This skill/knowledge area, like every other such area in this framework, has four possible performance levels (Not Required, Comprehension, Application, and Analysis). The required performance level depends on the class level of the job. At class level I (the lowest job class), quite a few core competencies are not required, most that are required require only comprehension, and only a few require application or analysis. In contrast, at class level IV (the highest level) many of the core competencies require the highest performance level – analysis.

In addition to core competencies, the ABC approach also includes “capabilities,” most of which are areas of foundational knowledge, such as knowledge of chemical application procedures and knowledge of math concepts.

The ABC approach yields a large number of relatively narrowly defined skill/knowledge areas. This approach meets the need of water utilities to provide specific technical training and to develop certification standards for jobholders.

WHY ORGANIZATIONS HAVE DEVELOPED COMPETENCY MODELS

The business reasons for developing competency models all concern increasing the productivity and effectiveness of the workforce in order to achieve improved business results.
The assumption is that you can improve workforce productivity and effectiveness through competency-based approaches to managing people. Here are some examples:

- Reduce the percentage of bad hires by screening applicants to ensure that each person who is hired has the competencies needed for effective performance. As a result, new hires have greater productivity.

- Improve the productivity of staff by assessing applicants to ensure that each new hire possesses some of the competencies that distinguish superior performers. As a result, a greater percentage of new hires will develop into superior performers.

- Improve the productivity of maintenance staff by developing and implementing a competency based technical training program to ensure that maintenance employees learn and apply the technical skills needed to perform standard maintenance tasks. As a result, the learning curve for new maintenance staff is reduced, and maintenance work can be accomplished with fewer staff.

- Increase the effectiveness of new managers by assessing them on managerial competencies and providing feedback and coaching, so that the managers demonstrate the competencies more often and more effectively, thereby increasing the productivity of staff in their units.

- Develop a competency-based succession planning program to ensure that for each critical position the organization has a potential successor who has either developed all of the necessary competencies for the position or is working on a plan to develop those competencies. As a result, negative effects on business performance are minimized in the event of a key person leaving the organization.

- Increase the frequency with which important competencies (e.g., teamwork, results orientation) are demonstrated, by assessing these competencies as part of the performance review process. The increased demonstration of these competencies should enhance business results.

The causal chains described above are based on logic. Productivity and effectiveness should be improved by developing and implementing competency-based programs to improve the selection, development and training of staff, and these programs should improve business results. In the case of selection, a competency-based selection interview program yields candidates who out-perform candidates hired using other, non-standard interviewing methods (Golec and Kahya 2007).

**GENERAL PROCESS FOR DEVELOPING COMPETENCY MODELS**

A typical competency model looks as though it should be easy to develop. It might include a dozen or so competencies, each with a definition and a set of behavioral indicators. Why not pull together several people, including at least one person with knowledge of the target job, a Human Resources professional, and someone who writes well? With a morning’s effort
and some other competency models to examine as examples, these people could identify and agree on a set of competencies and create or adapt some definitions and behavioral indicators. This “armchair” approach has been used often in the history of competency modeling, but it is a poor way to develop a competency model. Because there is no systematic gathering and analysis of data from jobholders or their managers, the competency model is likely to leave out skills and qualities that are needed for effective performance, and include elements that are unrelated to effective or superior performance. A competency model developed in this way is likely to be incomplete, inaccurate, and unhelpful.

Developing an effective, useful competency model requires gathering data in a structured, systematic way from people in the best position to understand what the job requires: jobholders who are performing the job at least effectively and persons who have recent experience managing jobholders. Sometimes it is possible to gather data from other persons, such as internal or external customers, who have direct experience with a variety of people who are performing key parts of the target job.

**Systematic Ways of Gathering Data for Development of a Competency Model**

Many methods of data collection have been used and these methods are described below. These methods could be applied individually or in various combinations.

**Job Analysis Interviews with Jobholders**

These are 30 to 60 minute interviews with individual jobholders who are thought to be performing their job at least effectively. The interviewer uses an interview guide with a standard set of questions and takes notes to record the interviewee’s responses to each question. The questions are typically designed to yield a breakdown of the important tasks for the job, along with other, related information. Here is a typical sequence of questions:

1. What would you say are the four or five most important responsibilities in your job? If you will give each responsibility a name, I will note the names and then ask you a series of questions about each responsibility.
2. The first responsibility that you mentioned was _______.
   a. What are the key tasks that you perform as part of that responsibility?
   b. What are the criteria or measures that could be used to judge how well that responsibility is being performed?
   c. What approaches have you found to be most effective in performing this responsibility?
   d. What skills does someone need, in order to perform that responsibility effectively?
3. Repeat question 2 for each of the responsibilities mentioned in response to Q1.
4. What are the most challenging situations someone is likely to encounter in this job?
5. What skills or qualities does someone need in order to handle each of the challenging situations that you mentioned?
Job Analysis Interviews with Managers of Jobholders

These are 30 to 60 minute interviews with persons who have recent experience managing jobholders. The interviewer takes notes during the interview to capture the gist of the manager’s response to each question. Once again, there is a standard set of interview questions, which includes a breakdown of main responsibilities and tasks. These may also include questions about superior performing jobholders and ineffective jobholders. Here are some sample questions:

1. What would you say are the four or five most important responsibilities in this job?
2. The first responsibility that you mentioned was _______.
   a. What are the key tasks that jobholders perform as part of that responsibility?
   b. What are the criteria or measures that could be used to judge how well that responsibility is being performed?
   c. What approaches have you found to be most effective in performing this responsibility?
   d. What skills does someone need, in order to perform that responsibility effectively?
3. Repeat question 2 for each of the responsibilities mentioned in response to Q1.
4. What are the most challenging situations someone is likely to encounter in this job?
5. What skills or qualities does someone need in order to handle each of the challenging situations that you mentioned?
6. Think of two or three persons you have managed who have performed this job in a superior way. I don’t need their names. What skills or characteristics do you believe were most important to each person’s effectiveness?
7. Think of two or three persons you have managed who performed this job much less effectively. I don’t need names. What skills or characteristics were lacking that might explain the less effective performance?

Behavioral Event Interviews with Jobholders

This method was originally developed around 1970 by the psychologist David McClelland as a way of identifying competencies that differentiate superior from average performers in a job (McClelland, 1973.) McClelland’s approach involved conducting in-depth interviews, typically lasting 1 ½ to 2 ½ hours each, with samples of jobholders identified through supervisory ratings and other performance measures as either superior performers or average performers. The interviewee is asked to think of several key projects or situations from the past year or two that were key accomplishments. For several of these accomplishments the interviewee is asked to trace the sequence of his/her involvement in great detail: how did the interviewee initially become involved, what were his initial thoughts about how to approach the project or situation; what did he/she do, think and say at key points in the sequence, and what was the outcome of the project or situation? The interviewer uses a probing strategy to ask for clarification or additional detail and to keep the interviewee focused. The goal is to find out what the interviewee did, thought and said at key points during the sequence of each project. Besides asking the interviewee to describe several successes, the interviewer may also ask the interviewee to describe his/her involvement in one or two projects situations that did not turn out successfully.
The interviews are tape recorded and transcribed for analysis. One or more analysts read each transcript searching for themes related to superior performance. The themes are captured on index cards or Excel templates. A team of analysts then reviews the themes from all the interviews and, in a process that can take several days, distills the themes into a set of competencies and behavioral indicators.

Since McClelland developed this methodology, other practitioners have developed variations and refinements of it. For example, instead of asking the interviewee to focus on major accomplishments, the questions might focus on times when the interviewee felt effective performing each of several previously identified main responsibilities for the job.

Behavioral Event Interviewing is probably the best and most reliable way to identify the competencies differentiating superior from average performance, and it is an essential way of identifying behavioral indicators for such competencies. But because of the extensive time required to conduct and analyze these interviews, they are used less often now than was the case a decade or two earlier. When they are used, it is often with a streamlined version of the interviewing and analysis process. For example, Richard Mansfield has developed a structured “Key Event Interview” which uses a sequence of standard questions that are specified on the interview guide. Interviewers can conduct effective interviews after a short training session, rather than going through the two to three days of training needed to master the original probing strategy. The analysis process is also simplified so that it requires less training and less time for completion (Mansfield 1996.)

Resource Panels

A resource panel is a structured, facilitated session with a group comprised of effective performers currently in the target job and managers of persons in the job, sometimes complemented with Human Resources or learning and development staffs who have worked extensively with persons in the target job. Various questions are posed to the panel, and each person on the panel is given the opportunity to respond to each question. Responses are captured on a flip chart by the facilitator or an assistant. Many of the questions used in Job Analysis Interviews can also be used with Resource Panels. Possible questions include:

1. What are the four or five most important responsibilities in this job?
2. For each main responsibility,
   a. What are the key tasks?
   b. How is performance formally or informally assessed? What are the performance criteria?
   c. What skills and knowledge are needed?
3. What are the most challenging situations encountered by jobholders?

In addition to posing questions about the job as it currently exists, the facilitator also asks the panel to identify ongoing or anticipated changes – in the organization and the industry – that will affect the job and the skills and personal characteristics that will be needed for effective performance. The panel may also be asked to review descriptions of a set of non-technical
competencies, and select the ones they believe are most important to the target job. A resource panel is typically scheduled for about half a day.

Resource panels are an efficient way to gather useful information to develop a competency model. Another advantage is that if the panel members have credibility, their consensus judgments about job requirements are likely to be accepted in the organization. One problem with resource panels is that if the participants work in geographically diverse locations, it can be expensive to pull them together for a meeting. Another problem is that the participants’ demanding schedules may make them unwilling to commit a large block of time to a meeting about a topic that they may see as having lower priority than their other responsibilities.

Surveys of Jobholders and Managers of Jobholders

Surveys are often used to obtain quantitative ratings of the importance and frequency of demonstration of tasks and skills identified from other sources, such as Job Analysis Interviews or Resource Panels. Analysis of survey ratings can help identify the most important elements to retain in a competency model. Surveys have also been used to rate the importance of a set of generic or commonly encountered competencies. On-line surveys are easy and inexpensive to construct, administer and analyze. Using a survey permits involving a large group of stakeholders (for example, all persons holding a target job).

Less frequently, surveys have been used to gather qualitative data, such as jobholders’ responses to an open-ended question about the skills and knowledge needed to perform each main responsibility of a job. Using open-ended questions in an on-line survey, it is possible to pose the same questions that would be used at a Resource Panel, without having to pull together all of the participants.

Using Competency Glossaries

As stated earlier, a competency glossary contains a set of commonly encountered competencies with definitions and other descriptive material, such as commonly observed behavioral indicators. Within a competency glossary, the competencies are often grouped conceptually. For example, the glossary may group the competencies into clusters such as: task accomplishment, thinking and problem solving, working with people, self management, and management and leadership.

A competency glossary should be used by a competency model building team, after first reviewing data from other sources, such as a Resource Panel, a set of Job Analysis Interviews, or a set of Behavioral Event Interviews. The competency model building team can use a competency glossary to answer questions such as:

- In light of the skill requirements proposed by the Resource Panel, which of the general competencies described in the competency glossary are applicable to this job?
- In view of the agreement from Job Analysis Interviews about the importance of interpersonal skills in this job, which of the competencies from the competency
glossary should be used in this competency model, and which behavioral indicators from the glossary should be used or adapted?

Another approach is to use the competencies from a competency glossary as items in a survey and ask jobholders and/or managers or jobholders to rate the importance of each generic competency to effective performance of the job.

**Analysis and Integration of Data**

In the preceding sections several methods were presented for collecting data to be used in building a competency model. Whatever sources are used to gather data, the next step in building a competency model is to analyze and integrate the data. This involves first analyzing the data from each source used. A systematic approach should be used for each type of data.

**Analyzing Job Analysis Interviews**

Job Analysis Interviews primarily yield qualitative data: the respondent’s answers to open-ended questions about job responsibilities, tasks performed as part of each responsibility, skills needed to perform each responsibility, etc. The approach for analyzing this type of data is to read through all the responses to a question from all interviewees, identify themes mentioned by more than one interviewee, assign a unique code to each theme (e.g., a, b, c, etc.), review each response and note each code that applies, and then count the number of interviewees mentioning each theme. Using a process like this, the competency model building team can identify the most frequently mentioned themes and be sure to include or consider them when determining which competencies to include in the competency model.

**Analyzing Behavioral Event Interviews**

Behavioral Event Interviews also yield qualitative data: themes (behaviors, skills or personal characteristics) that appear to be related to effective performance. As noted earlier, the transcript of each interview is carefully reviewed, and the analyst notes themes related to effectiveness and captures these themes, along with the page and line numbers of the interview transcript, usually on index cards. Unless there are only a handful of interviews to analyze, the transcripts are allocated to several analysts, each of whom read and analyze several transcripts. The analysts then meet for one or more days to review all the themes and examples, group the themes conceptually, and select or formulate competencies and behavioral indicators that encompass what appear to be the most important and frequently occurring themes. The team of analysts may use a generic competency glossary by selecting or adapting competencies and behavioral indicators that reflect the most important themes noted in the interview transcripts.

Reading and analyzing these transcripts is a complex process that requires some training from an experienced expert.
Analyzing Resource Panel Data

Analyzing data from a single Resource Panel is straightforward. All that is required is to transcribe the flip charts notes from the panel session. If the panel rated the importance of a set of generic competencies, these ratings should be averaged and sorted so that the competencies are listed in order of importance ratings.

Analyzing Survey Data

Most surveys require participants to make quantitative ratings of elements such as job tasks or job skills. Analysis of each rating question involves computing the average rating of each element and sorting the elements in order of their ratings.

Integrating the Data from Different Sources

After each source of data has been analyzed, the next step is to review and integrate similar types of data obtained from different sources. For example, if both Job Analysis Interviews and a Resource Panel posed questions about the responsibilities for the job, the responsibilities obtained from these two sources would be compared, and a single list of main responsibilities would be prepared. The analysts would use a similar process to prepare an integrated master description of the job, which might include the most important responsibilities, tasks performed as part of each responsibility, performance criteria for each responsibility, technical skills and knowledge needed in the job, and non-technical competencies skills identified for the job.

Selection of Competencies for the Competency Model

After analyzing the data collected from all sources, the competency modeling team is in a position to select the competencies for the job that will appear in the competency model. If the competency model will be used to develop training curriculum or certification standards, it is important to include a comprehensive set of competencies – all the competencies needed for effective performance of each main responsibility. The result is often a large number of competencies: 20 or more.

If the competency model will be used to guide professional development of jobholders, to guide selection of candidates for this position, or to apply the competencies in performance management and review, it is desirable to limit the number of technical and nontechnical competencies (not foundational) to a small number (8 to 15) in most cases. Because of most people’s limited tolerance for complexity, it is difficult to ask them to understand and remember large numbers of competencies. These problems are especially apparent when people are asked to assess themselves or a co-worker on a large number of competencies.

To limit the number of competencies in a competency model, practitioners simply omit competencies that are judged to be less important or ones that do not appear to contribute to superior performance. Practitioners using this approach sometimes retain a separate set of “threshold” competencies which are expected to be fully developed in most jobholders before
they enter the target job. The list of threshold competencies is available for remedial use as needed, but most people management applications are based on the primary set of competencies that appear in the competency model for the job. To make the competency model easier to understand and work with, the competencies are often grouped into clusters. For example, the competencies concerned with task accomplishment might be grouped into a cluster called Achieving Results, while competencies involving interpersonal skills might be grouped into a cluster called Working with People.

Preparing the Competency Model Draft Document

Once the competencies have been selected, the model building team should prepare a draft document of the competency model. This document usually includes:

- A one-page outline of the competencies within their clusters
- A detailed description of each competency, in which it is displayed with
  - A definition
  - A set of behavioral indicators showing common ways that the competency is demonstrated

The document may also include additional components, such as:

- A graphic representation of the competencies and clusters
- An outline of the main responsibilities for the job, with key tasks shown for each main responsibility
- A matrix of competencies by main responsibilities with X’s showing which competencies are used in the performance of each main responsibility

Reviewing and Revising the Competency Model With Stakeholders

Before finalizing the competency model, the draft document should be shared with key stakeholders, such as the project’s sponsors and jobholders and managers of jobholders who have provided input during the data collection phase of the project. The stakeholders reviewing the competency model are asked to provide feedback and suggestions for improvement – for example, by identifying competency definitions or behavioral indicators that are unclear, and by identifying any important skills that appear to be omitted from the competency model.

THREE STRATEGIES FOR DEVELOPING COMPETENCY MODELING

The previous sections have described the general process for developing competency models. Practitioners adapt this process depending on the number and type of competency models they are trying to develop. It is possible to identify three approaches or strategies for competency modeling: the Single Job Competency Model, the One Size Fits All Strategy, and the Multiple Competencies for Multiple Jobs Strategy. Each of these strategies will be discussed briefly in the sections that follow.
Single Job Competency Model

This approach is used when an organization is interested in developing a competency model for one critically important job and is not planning to develop competency models for other jobs. For example, a high-tech manufacturing company might see the job of Sales Representative as critically important to its business success. An engineering firm might focus on the job of Project Manager. Because the competency modeling will focus on only one job, it is possible to invest more time and money to build this model than would be the case if the organization were planning to build ten competency models for ten different jobs. The competency model building team might invest the time to conduct and analyze Behavioral Event Interviews with a dozen superior performers and analyze the data carefully to identify and write precise behavioral indicators describing how each competency is developed in specific situations encountered in this job. Since there is no plan to develop competency models for other jobs, competencies can be defined and specified for the target job, without consideration of whether they need to be written so that they might also apply to other jobs for which competency models will be developed.

This approach has not been used much in water utilities, because water utilities are usually interested in competency modeling approaches that apply to more than one job.

One Size Fits All Strategy

This approach involves developing one set of competencies that is intended to be applied to a wide range of jobs. For example, an organization might want to have one set of non-technical competencies for individual contributor positions and another set for managers and leaders. Each of these two sets would be a One Size Fits All competency model. An advantage of this approach is that it offers a solution that can be implemented quickly, with broad impact on staff throughout the organization. This approach is often adopted when organizational leaders value simple solutions. The One Size Fits All Approach also simplifies the development of applications based on the model. For example, with one set of competencies for all managers and leaders, you need only one standard performance appraisal form for use with all managers.

Another advantage of this approach is that it lends itself to developing and reinforcing a consistent message about the organization’s values and strategic direction. A senior leader who wants to change the organizational culture of his/her organization may find it convenient to identify a consistent set of competencies (such as Teamwork, Results Orientation, and Valuing Others), that will support the leader’s vision for the organization.

Possibly because of the appeal of simplicity, this approach to competency modeling has been widely used, but it does have disadvantages. The competencies that are identified in a One Size Fits All model do not capture everything that is needed for effective or superior performance in any specific job. The competencies do not provide an adequate basis for selecting people into a specialized role, such as electrical engineer or maintenance manager.

When developing a One Size Fits All competency model, there is no need to conduct Job Analysis Interviews, or to ask Resource Panel participants to identify main job responsibilities.
The reason is that the jobs encompassed by the competency model will have widely different responsibilities.

**Multiple Competencies for Multiple Jobs Approach**

This approach is adopted when there is a need to develop many different competency models concurrently, throughout an organization. Early in the process, the competency modeling team develops or adapts a competency glossary: a set of competencies and definitions that are used as building blocks to construct competency models for specific jobs.

In building a competency model, the competency modeling team selects a specific set of appropriate competencies from the competency glossary and may adapt the descriptions of the competency (e.g., its behavioral indicators or definitions of competency levels) to fit the job in question.

When technical competencies are to be included in the competency models, as is often the case, there may be no available competency glossary containing the technical skills and knowledge that are needed for all or some of the competency models. When this is the case, the competency modeling team will need to identify and define some or all of the technical competencies that will serve as building blocks for competency models. Members of the team will need to conduct individual or group interviews with subject matter experts (usually managers or senior individual contributors) within a department or function and ask these experts to conceptualize technical skill/knowledge areas needed by staff within that department or function. Working within departments or functions, the competency modeling team writes descriptions of each technical skill/knowledge competency and revises these descriptions with the subject matter experts. Technical competencies are usually specified using a common set of competency levels (e.g., Basic, Intermediate, Advanced). These levels have general definitions that apply for every technical competency, but sometimes specific definitions of the levels are created for each competency, to show, for example, what specific skills and knowledge are possessed by someone at the Advanced level.

Competency levels are useful because they can be used as the basis for assessing people. But sometimes technical competencies are defined using behavioral indicators. If behavioral indicators are used, a unique set of behavioral indicators may need to be identified for each job. Two competency models may both include a particular technical competency, but the set of behavioral indicators identified for the two competency models may differ.

**Combining the Three Strategies**

Sometimes practitioners find it useful to combine one or more of the strategies. For example, an organization might adopt a Multiple Competencies for Multiple Jobs Approach that uses an extensive competency glossary comprised of technical skills that are used to differentiate the requirements of different jobs. This organization might also use a small set of non-technical competencies which are used as part of the competency model for every job – a One Size Fits All Approach.
As another example of combining approaches, an organization might adopt the Multiple Competencies for Multiple Jobs Approach but do extensive data gathering on one or more critically important jobs (the Single Job Approach).

This project developed twelve competency models to serve as examples of how to apply the competency modeling approach in water utilities. Detailed descriptions of the twelve competency models for the water utility positions can be found in Appendix A.
CHAPTER 3:
ADAPTING ONE OF THE TWELVE COMPETENCY MODELS TO SIMILAR UTILITY JOBS

Utilities can adapt the models developed in this project for positions that are somewhat different in their organizations. This chapter offers a process that can be used to adapt one of the models.

OVERVIEW OF THIS PROCESS

To develop a competency model for a job at a water utility that is similar to one of the twelve key jobs for which a competency model was developed (Appendix A) the simplest approach is to convene a special meeting with several persons, and several managers of persons who hold this job (Resource Panel). In the first part of the meeting, the Panel is guided by a facilitator through a series of questions about the job so that the participants identify in their own language the competency requirements of the job. Participants’ contributions are captured on flip chart pages. As part of this process, the Panel also identifies the information needed to prepare a Job Description.

In the second part of the meeting the Panel reviews the existing competency model and identifies additions or changes that are needed to ensure that the competency model reflects the job in their organization. Someone from the Panel then uses the notes from the meeting and competency model templates (Appendix D) to prepare the adapted competency model and Job Description, if one is needed.

PLANNING AND PREPARING FOR THE RESOURCE PANEL

Here are some key steps in planning and preparing for the Resource Panel meeting. They are also summarized in Figure 3.1

1. Identify the Resource Panel participants. You should include two to four capable people who currently hold the job and two to four capable managers of persons in the job.
2. Identify a facilitator. The facilitator could be one of the persons already identified for the panel or an HR or Learning and Development person. The facilitator should be someone with experience leading meetings.
3. Identify how the competency will be used and how this will benefit the organization. You will include this information when inviting the participants and when starting the Resource Panel meeting.
4. Schedule a 3-hour block of time and a room for the meeting.
5. Invite the Panel participants. In your email communication explain the purpose and format of the meeting.
6. Prepare materials for the meeting, including:
   a. Flip chart(s), new markers, and masking tape for hanging flip chart pages.
   b. Copies for each participant of the following materials:
      1. Existing Job Description, if any, for the job
2. Competency Model that is to be adapted (available at the Water Utility Workforce Needs Website)
3. Outline of Resource Panel Activities for Adapting a Competency Model
4. Competency Glossary (Appendix B and downloadable from the Water Utility Workforce Needs Website)

7. Meet with the facilitator for the meeting and review the plan and materials for the Resource Panel.

![Planning steps for the resource panel](image)

**Figure 3.1** Planning steps for the resource panel

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HOLDING THE RESOURCE PANEL

The facilitator or the project sponsor will explain the purpose of the project including why a competency model is needed and how it will be used. The facilitator then walks the Panel through each of the questions about job responsibilities, as outlined below, to capture the information needed for the development of the competency model. The facilitator writes each question at the top of a flip chart page and captures participants’ ideas below the question. As flip chart pages are completed, they should be numbered and posted on walls of the meeting room so that participants can refer to the ideas, as needed.

After the Panel has completed the questions about the existing job, the facilitator leads them through a process of reviewing the existing competency model and identifying any additions and changes that are needed, based on the previous discussion of the job. The facilitator appoints a recorder to write clear and complete notes about the agreed additions and changes to the Competency Model.

If the Panel believes that additional competencies are needed, they should refer to the Competency Glossary, which includes almost all non-technical competencies that are likely to be needed and many technical competencies. If a new technical competency is needed, it should be written in a format similar to the format of other technical competencies in the Competency Glossary. Most often, this involves specifying the domain of expertise and possibly some sub-domains.

In managing the Panel, the facilitator should keep the Panel focused on tasks, ensure that everyone has a chance to weigh in on a question, and, when appropriate, ask Panel members to clarify their ideas.

At the end of the meeting the facilitator should ensure that someone commits to taking all of the meeting’s flip chart notes and discussion notes to prepare an adapted competency model and a Job Description, if one is needed.

The process is outlined below.

Collect Information Needed for a Competency Model From Resource Panel

What are the three to five most important main responsibilities for the job? (Review the main responsibilities at the end of the General Competency Model you are adapting and identify any additions or modifications.)

1. For the first main responsibility, answer each question below:
   a. What are the most important tasks?
   b. What technical skill and knowledge are needed?
   c. What non-technical skills and personal characteristics are needed
2. Repeat question 2 for each additional main responsibility.
3. What are the most challenging situations that the jobholder must deal with?
4. What skills and personal characteristics are needed to deal with these challenging situations?
5. What skills, personal characteristics or behaviors distinguish outstanding performers?

**Review and Agree on Changes to the General Competency Model That You Are Adapting**

6. Review the overall structure of the general competency model
   a. Main competencies, divided into technical and non-technical sections
   b. Foundational competencies (expected before entry into the job), divided into technical and non-technical sections
   c. Competencies and behaviors leading to superior performance
   d. Main responsibilities for the job

7. Review the technical competencies in the general competency model and compare them with the technical skill requirements that you have identified so far in the Resource Panel Session
   a. On a copy of the general model, note any changes or deletions to any of the sections on technical competencies
   b. Identify any technical competencies that need to be added to the general competency model

8. Compare the non-technical competencies in the general model and compare them with the non-technical skill requirements that you have identified so far in the Resource Panel Session
   a. On a copy of the general model, note any changes, additions or deletions to any of the sections on non-technical competencies
   b. Identify any non-technical competencies that need to be added to the general competency model. Consult the Competency Glossary to find needed non-technical competencies that are not included in the general competency model
   c. For each non-technical competency that you plan to include in the adapted competency model, select three to eight behavioral indicators that are most appropriate for the job
   d. If the behavioral indicators in the Competency Glossary do not fully or accurately describe how jobholders need to demonstrate the competency, consider adapting behavioral indicators or writing new ones

9. Compare the general competency model’s section on superior performance with the Resource Panel’s ideas about superior performance (Question 6) and identify any changes or additions you would like to make to the general model

10. Compare the main responsibilities in the last section of the general competency model with the Resource Panel’s set (Question 1), and identify any changes you would like to make, when adapting the general competency model

**Collect Information Needed for Job Description**

*Note: If time is available, complete this section as part of the Resource Panel; if not, assign this section to one or two of the managers of jobholders, to be completed as part of the follow-up activities.*

11. If an existing Job Description is available, review it and identify any needed changes or additions
If a new Job Description is needed, prepare answers these questions:

12. What is the title(s) for this job or set of jobs?
13. What is the purpose of this job? (1 sentence)
14. What is the title of the position to which this job reports?
15. What supervisory responsibility is there, if any? (number of persons supervised and their roles)
16. What decision-making responsibility is there?
17. What educational degrees or certifications, if any, are required (essential)?
18. What previous work experience, if any, is required (essential)?
19. What is the travel requirement, if any? (percentage of time)

Post-Resource Panel Follow-Up Activities

- Use the notes from the Resource Panel to prepare a clean, adapted version of the general competency model
- Use notes from the Resource Panel and the Job Description template in Appendix C to prepare a Job Description
- Send the new, adapted competency model and the Job Description to panel members for review. Ask them to identify any editorial changes that may be needed
- Make any edits that are needed and distribute the revised Competency Model and Job Description to all appropriate stakeholders
CHAPTER 4:
DEVELOPING A COMPETENCY MODEL FOR DIFFERENT UTILITY JOBS

Using the process described in this chapter, utility personnel can develop a competency model for a position that is different from the twelve positions for which this project developed competency models.

OVERVIEW OF THIS PROCESS

To develop a competency model for a job at a water utility that is dissimilar to the twelve general jobs for which competency models were developed (Appendix A), the simplest approach is to convene a special meeting with several persons who hold this job and several managers of persons who hold this job (Resource Panel). In the first part of the meeting, the Panel is guided by a facilitator through a series of questions about the job so that the participants identify in their own language the competency requirements of the job. Participants’ ideas are captured on flip chart pages. As part of this process, the group will also identify the information needed to prepare a Job Description.

In the second part of the meeting the group reviews the Competency Glossary to identify and adapt competencies to be included in the Competency Model and to conceptualize any additional competencies that are needed but not included in the Competency Glossary. Someone from the Panel then uses the notes from the meeting and competency model templates (Appendix D) to prepare the new competency model and Job Description.

PLANNING AND PREPARING FOR THE RESOURCE PANEL

Here are some key steps in planning and preparing for the Resource Panel. These are also summarized in Figure 4.1.

1. Identify the participants. You should include two to four capable persons currently holding the job and two to four managers of jobholders.
2. Identify a facilitator. The facilitator could be one of the managers or persons in the job or an HR or Learning and Development person. The facilitator should be someone with experience leading meetings.
3. If the facilitator is not highly familiar with the job in question, he/she should conduct two one-hour Job Analysis Interviews with jobholders. A guide for conducting this interview is included in this document. The purpose of conducting the interviews is to ensure that the facilitator has some understanding of the job, before leading the Resource Panel.
4. Identify how the competency will be used and how this will benefit the organization. You will include this information when inviting the participants and when starting the Resource Panel meeting.
5. Schedule a meeting room and a half-day block of time for the meeting.
6. Invite the participants. In your email communication explain the purpose and format of the meeting.
7. Prepare materials for the meeting, including:
   a. Flip chart(s), new markers, and masking tape for hanging flip chart pages
   b. Copies for each participant of the following materials:
      1. Existing Job Description, if any, for the job
      2. Competency Glossary (available at www.eetinc.com/competency)
      3. Competency Model Template, included in Appendix B

8. Meet with the facilitator for the meeting and review the plan and materials for this Resource Panel.

Figure 4.1  Planning steps for the resource panel

HOLDING THE RESOURCE PANEL

The facilitator or the project sponsor should explain the purpose of the project: why a competency model is needed and how it will be used. The facilitator writes a series of questions from the section below, “Gather Information Needed for a Competency Model” at the top of a
flip chart page and captures participants’ ideas below the question. As flip chart pages are completed, they should be numbered and posted on walls of the meeting room so that participants can refer to the ideas, as needed.

After the Panel has completed the questions about the job, the facilitator leads them through a process of reviewing the Competency Model Template and the Competency Glossary and identifying content to be included in the Competency Model. The facilitator should ask someone from the Panel to write clear and complete notes about the agreed content to be added to the Competency Model Template.

For almost all non-technical competencies and many technical ones, the Competency Glossary should include competencies which can be used or adapted in the Competency Model. If a new technical competency is needed, it should be written in a format similar to the format of other technical competencies in the Competency Glossary. Most often, this involves specifying the domain of expertise and possibly some sub-domains.

In managing the Panel, the facilitator should keep the Panel focused on its tasks, ensure that everyone has a chance to respond to a question, and, when appropriate, ask Panel members to clarify their ideas.

At the end of the meeting the facilitator should ensure that someone commits to taking the flip chart notes and the notes from the discussion of additions and changes to the existing competency model and using these notes to prepare the Competency Model and a Job Description, if one is needed.

The process is outlined below.

**Gather Information Needed for a Competency Model**

Capture the group’s ideas for each numbered question on flip chart pages.

1. What are the three to five most important main responsibilities for the job? (First generate a list of ideas about main responsibilities. Condense and combine the ideas to identify the three to five main responsibilities that the Resource Panel will use.)
2. For the first main responsibility, answer each question below:
   a. What are the most important tasks?
   b. What technical skill/knowledge is needed?
   c. What non-technical skills and personal characteristics are needed?
3. Repeat question 2 for each additional main responsibility.
4. What are the most challenging situations that the jobholder must deal with?
5. What skills and personal characteristics are needed to deal with these challenging situations?
6. What skills, personal characteristics or behaviors distinguish outstanding performers?
Identify Content for the Competency Model

7. Review the overall structure of the Competency Model Template.
   a. Main competencies, divided into technical and non-technical sections
   b. Foundational competencies (expected before entry into the job), divided into technical and non-technical sections
   c. Competencies and behaviors leading to superior performance
   d. Main responsibilities for the job
8. Review all the technical skill requirements that you identified in the first part of the Resource Panel.
9. Compare the technical skill requirements with technical competencies in the Competency Glossary.
   a. Identify technical competencies which can be taken, as is, from the Competency Glossary, and included in the competency model.
   b. Identify technical competencies from the Competency Glossary that will need to be modified when included in the competency model. Discuss and agree on the modifications that are needed. (Take clear notes about needed modifications on a copy of the Competency Glossary.)
   c. Identify technical skill requirements that need to be included in the competency model but cannot be found in the Competency Glossary.
10. Review the Competency Model Template and identify which technical competencies will go in which sections. (Take clear notes.)
11. Compare the non-technical skill requirements that you identified in the first part of the Resource Panel with the non-technical competencies in the Competency Glossary.
   a. Identify non-technical competencies which can be taken, as is, or adapted from the Competency Glossary, and included in the competency model.
   b. Discuss and agree on the modifications that are needed – such as the elimination modification of specific behavioral indicators. (Take clear notes about needed modifications on a copy of the Competency Glossary.)
   c. Identify any non-technical skill requirements that need to be included in the competency model but cannot be found in the Competency Glossary. (*Such instances should be rare, because the Competency Glossary includes a comprehensive set of non-technical competencies.*)
12. Based on the Resource Panel’s ideas for Question 6, regarding superior performance, select which of the competencies to include in the section of the Competency Model describing superior performance.

Information Needed for Job Description

*Note: If time is available, complete this section as part of the Resource Panel; if not, assign this section to one or two of the managers of jobholders, to be completed as part of the follow-up activities.*

13. If an existing Job Description is available, review it and identify any needed changes or additions.
If a new Job Description is needed, prepare answers these questions:

14. What is the title(s) for this job or set of jobs?
15. What is the purpose of this job? (1 sentence)
16. What is the title of the position to which this job reports?
17. What supervisory responsibility is there, if any? (number of persons supervised and their roles)
18. What decision-making responsibility is there?
19. What educational degrees or certifications, if any, are required (essential)?
20. What previous work experience, if any, is required (essential)?
21. What is the travel requirement, if any? (percentage of time)

Post-Resource Panel Follow-Up Activities

- Use the notes from the Resource Panel and the Competency Model template (in Appendix D) to prepare a draft version of the general competency model.
- Use notes from the Resource Panel and the Job Description template in Appendix C to prepare a Job Description.
- Send the new Competency Model and the Job Description to panel members for review. Ask them to identify any editorial changes that may be needed.
- Make any edits that are needed and distribute the revised Competency Model and Job Description to all appropriate stakeholders.
CHAPTER 5:
APPLICATIONS FOR COMPETENCY MODELS

The competency models developed for an organization can be applied in a wide range of personnel processes.

Competency models can be used to aid in personnel development, staff selection and performance management. This chapter describes:

• Applying competency models in personnel development
• Applying competencies to guide personnel selection
• Applying competency models in performance management
• Other potential applications

PERSONNEL DEVELOPMENT

Probably the most common application of competency models is to promote professional development. These applications usually include some combination of the following tools:

• Competency Assessment Tools (forms, tests, and assessment centers)
• Resource Guides
• Development Planning Forms
• Structured Processes Involving Competency Assessment and Development Planning

Each of these types of tools will be discussed in a section below.

Competency Assessment Tools

A variety of tools and processes have been used to assess competencies, as described below.

Competency Assessment Rating Forms

These are administered either in paper-and-pencil format or on a computer and are often designed to be completed by a jobholder and his/her manager. The form may present the competency name and definition, or it may present a set of items adapted from the competency’s behavioral indicators, or it may present each competency with descriptions of a set of levels for the competency. The rating scale may be based on:

• How often the jobholder demonstrates the competency/behavioral indicator in relevant situations
• How effectively the jobholder demonstrates the competency/behavioral indicator
• Which level best describes the jobholder’s capabilities

The feedback report usually includes a table and bar graph of scores on the competencies, making it easy to determine which competencies are relatively strong and which are relatively
weak. If several items were used to assess each competency, the report usually includes an itemized analysis displaying the scores for each item assessing each competency.

A more thorough use of competency assessment rating forms involves gathering and summarizing data from sources besides the jobholder and his/her manager: direct reports, colleagues, internal or external customers. When the feedback comes from the boss, reports, and peers, the application is called 360 feedback (feedback from all directions or 360 degrees).

**Knowledge Tests**

When a competency includes a body of knowledge, the competency can be assessed through a knowledge test. This might be a paper and pencil test or a computer-administered one. Such tests have correct and incorrect answers, which are tabulated to compute a score on the competency.

**Performance Tests**

Some competencies that involve performance of physical tasks can be assessed by observing and assessing the jobholder’s performance. Competencies such as “keyboarding skill” and “aviation skill” could be assessed using performance tests.

**Assessment Centers**

An assessment center is an event which may take place over one or more days, to assess a set of persons on a set of competencies that have been identified for a job. Assessment centers use a variety of exercises and tools to assess the competencies. The exercises often simulate activities or situations that might be encountered in the job for which the competencies were identified.

One commonly-used exercise is called an “in-basket.” Each participant in the assessment center is given some background information on his role in a hypothetical organization. The participant then reads through a series of memos or messages in his/her in-basket and decides what to do about each memo or message. Other commonly used exercises include role plays, in which the participant is given some written background material on an issue involving a co-worker and is then asked to meet with an assessor who is pretending to be the participant’s manager, direct report, or other co-worker to discuss and address the issue. The assessor later scores the participant’s behavior for one or more competencies being assessed in the exercise.

Because assessment centers are expensive to design, staff, and implement, they are used infrequently.
Resource Guides

Resource guides are materials organized by competency that present readings and a variety of suggested activities for developing each competency. Resource guides can be distributed as booklets or in computer-accessible format. For each competency, the resource guide may include:

- A discussion of why the competency is important
- Books, readings, audio-visual materials, and websites that promote understanding of the competency
- Ideas for practicing and applying the competency
- Ideas for learning from people who are skilled in a competency
- Types of work assignments available to jobholders that can develop the competency
- Ideas for coaching someone who is trying to develop the competency

Jobholders and their managers are expected to review resource guides to identify specific developmental activities that jobholders will include in their development plans.

Development Planning Forms

A development planning form is a form used for a personal development plan. Based on an assessment of the jobholder’s competencies, the jobholder, often with the help of his/her manager, uses the development planning form to prepare a development plan.

A development plan may include sections for entering:

- Names of the jobholder and his/her manager
- Jobholder’s most important goals for coming year
- Tasks or situations expected to pose the greatest challenge for the jobholder
- Jobholder’s longer-term career goal
- Names of 1-4 areas targeted for development
- Specific actions the jobholder will implement (usually based on ideas from a resource guide) to develop each targeted area for development
- Targeted dates for completing each specific action that is part of the plan
- Signatures of jobholder and his/her manager

An example of a development planning form is shown at the end of Chapter 6.

Structured Process for Competency Development

To implement a competency-based professional development system, companies often set forth a process describing what is supposed to happen and who is supposed to do what, when. A description of the process is prepared and distributed in paper-and-pencil or in computer-accessible format. The document sets forth a sequence of events with detailed instructions. Usually, the process includes the elements shown graphically in Figure 5.1.
When implementing a competency-based professional development system, organizations often hold training or educational sessions to review the process and tools with jobholders and/or managers of jobholders.

**APPLYING COMPETENCIES TO GUIDE PERSONNEL SELECTION**

Applications for competency-based selection include tools, training and processes for assessing internal or external candidates on key competencies identified for specific positions. If a particular competency is identified as essential in all candidates, the selection process typically includes an early assessment of this competency, in a resume screening process, an initial telephone interview, or an initial in-person interview. For example, if a company were looking for a Spanish speaking civil engineer, it might screen resumes for fluency in Spanish and for a degree in civil engineering. In the initial interviews with candidates, the interviewer would follow up to verify that these criteria are present.
Structured, Behavior-Based Interviewing

To screen candidates for non-technical, behavioral competencies, structured interviews are developed to assess the competencies. Usually, these interviews ask the candidate to describe how he/she dealt with a specific situation likely to elicit the competency. For example, to assess the competency, “Fostering Teamwork,” the candidate might be asked this question:

“Tell me about a specific situation in which you took over management of a group. Walk me through the things you did with that group in the first couple of months with that group.”

The interviewer is trained to probe for specific details of what the person did, said and thought in key situations during his/her initial time with the group. After the interview, the interviewer scores the interview by assessing the evidence for behaviors and skills identified for that competency. Often, several different competencies are assessed in one interview.

Research has shown that structured, behavior-based interviewing to assess competencies identified through job analysis leads to better selection decisions than the unstructured interviewing that is most often used.

Assessing Technical Competencies

To assess technical competencies, a different interview guide might be developed, to be used by an interviewer with significant knowledge in the technical area being assessed. To assess depth and breadth of technical knowledge in a particular area, “X”, the guide might suggest a question like this:

“Tell me about a problem that you worked on in the last year or two in the area of “X.” What was the project, how did you decide to approach the problem in this way. What specifically did you do and why? What else did you do and why?”

Another approach to assessing technical competencies is to ask the candidate to prepare a presentation on work he/she has done in the general technical area. The candidate delivers the presentation to a group of staff with expertise in this area, who then pose additional questions requiring the candidate to defend his/her approach and analysis.

Components of a Competency-Based Selection Interviewing Application

A competency-based selection interviewing application to assess behavioral competencies often includes:

- One or more interview guides with introductory language, main questions, follow-up questions, spaces for note taking, and a competency rating form
- An interview training program to train hiring managers and others to conduct selection interviews
- Forms for tabulating and comparing assessment ratings on multiple candidates
• A document describing the selection process, with guidelines for assessing the competencies and making selection decisions

COMPETENCY MODEL APPLICATIONS IN PERFORMANCE MANAGEMENT

Identifying a Set of Competencies to Be Assessed

This area of application involves, at a minimum, adding an assessment of competencies as part of the performance management and review process. Most often, the competencies assessed are a small set of competencies identified by the organization for all individual contributors or for all managers; these competencies are assessed in a section of the performance review form. Usually the assessment is simple; a definition of each competency is provided, and the manager completing the form assesses his/her direct report on a simple rating scale with each level of the rating scale clearly defined.

An alternative to assessing on a fixed set of competencies is to allow the manager and jobholder to select several competencies from the relevant competency model that will be especially important for the jobholder to demonstrate, in order to achieve his/her goals for the upcoming review period. The manager writes the names of the competencies on the assessment form, and they are assessed on a standard rating scale. One of the constraints on competency assessment is that organizations usually want to use a standard performance appraisal form for each broad group of employees (e.g., individual contributors, managers, executives). This is the reason for assessing each group using a standard set of competencies or for allowing a small number of “write-in” competencies.

Deciding Whether to Use Competencies in Performance Appraisal Ratings

An organization that is developing a competency-based system in performance management will either be building a new performance management system from scratch or adding competency assessment to an existing performance management system. Either way, one critical decision is whether the competency assessment will count toward the overall performance evaluation, and if so, how much.

One solution is not to count the competencies at all: base the overall rating on achievement of performance goals and treat the competencies as skills and qualities needed to achieve the goals. In this case, the competency assessment provides potentially helpful feedback to the jobholder. A possible downside of this solution is that because the competencies don’t count toward the overall appraisal rating, they are not taken seriously by either the manager doing the assessment or the jobholder receiving it.

An alternative is to give enough weight to the competency assessment (say 20 percent) so that it is taken seriously. Some organizations give the competency assessment as much as 50 percent of the weight. A high weighting is especially likely when the senior leaders want to use the competency assessment to drive culture change, by rewarding qualities like teamwork, coaching, innovation, and valuing differences.
Integrating Competencies With Other Parts of the Performance Management Process

The annual performance appraisal is only one step in a larger process that may also include:

- Performance planning, goal setting and contracting
- Ongoing feedback and coaching
- Self assessment by the jobholder
- Interim assessments
- Development planning meetings

Consideration of the competencies may occur during any of these steps. During performance planning at the beginning of a review period, after identifying goals for the upcoming review period, the manager and jobholder might review the competency model for the job and discuss which competencies will need to be used and how, in order to achieve the goals. The ongoing feedback that the manager provides may concern ways that the jobholder’s behavior reflects key competencies. If the performance review process includes a self-assessment by the jobholder, this self-assessment should include a section on the competencies. Interim assessments, like the final performance appraisal, should include sections to assess the competencies.

Often, the performance management process includes a development planning meeting, which is best held in a separate meeting sometime after the performance appraisal meeting, when the jobholder and his/her manager are not distracted by emotional reactions to giving and receiving the overall rating. At the development planning, meeting the jobholder and his/her manager review the most recent competency assessment and identify a small number of areas for the jobholder to focus on for his/her development. They start the process of preparing a development plan, by identifying specific activities to develop each competency. For this purpose they may draw on a resource guide that suggests a wide variety of activities for developing each competency. The development plan may be a separate stand-alone document or a part of the jobholder’s overall performance plan and contract. An example of a development plan format is shown at the end of Chapter 6.

Components of Competency-Based Systems in Performance Management

Because implementing a competency-based performance management system involves changing a major organizational process, the application may include many components, such as:

- Performance appraisal forms for various groups of employees (e.g., non-exempt individual contributors, exempt individual contributors, managers, executives)
- Performance planning forms
- Forms for different groups of employees for interim performance assessments
- Documents or manuals explaining the performance management and appraisal process in detail, and setting forth expectations about the timeline and roles of individuals in the process
Competency Model Development and Application to Meet Water Utility Workforce Needs

- Communication materials for presenting and explaining the performance management process
- Training programs for managers who will be conducting performance appraisals
- Training programs for employees to educate them about their role in the performance management process

Resistance to Changes in Performance Management Processes

Organizations considering competency-based systems in performance management should be aware that changes to the performance appraisal system are likely to generate anxiety and resistance, especially if the changes may affect people’s compensation. Some people will fear that when competency assessment is counted toward the overall performance rating, their compensation will diminish. In addition many people have often had unhappy experiences with performance appraisal. A major change should not be attempted without strong commitment from the organization’s top leader(s).

OTHER APPLICATIONS OF COMPETENCY MODELS

In addition to the primary application areas of professional development, employee selection, and personnel performance management, competency models have been applied in some other ways which will be briefly discussed here.

Curriculum Development

Competency models can provide a good basis for developing curriculum. For this purpose, a single-job competency model is often especially helpful. The in-depth research on the job that this approach entails, along with a detailed task analysis, can yield a rich model that enables curriculum designers to plan training modules addressing each skill needed for effective performance. These competency models can also serve as the basis for establishing certification standards that describe the knowledge and skills that should be mastered by persons in particular jobs. If behavioral event interviews have been conducted, they often provide examples of how the competencies need to be applied, in order to achieve superior performance.

The one-size-fits-all approach can also be useful for curriculum development. Many organizations that have developed one-size-fits-all competency models for broad sets of leadership positions, have used the leadership model by building training modules around particular competencies.

Succession Planning

Competency-based succession planning involves identifying competency requirements and other experiential requirements (for example, experience managing a large organization) needed for senior leadership and other positions that are considered key to the organization’s future. Individuals are assessed against these requirements, and, on the basis of the assessments, potential replacements are identified for each position, along with the competency and experiential gaps that would need to be closed before the replacement individual would be ready.
to move into the position. The organization plans developmental experiences that will close the gaps so that there will be replacements ready to fill each key position, in the event that the current jobholder leaves the organization or can no longer continue in the job.

**Competency-Based People Management Software**

Many software program suites have programs that have been developed to manage a wide range of people management tasks, including selection of internal and external candidates for positions, assessment and professional development of staff, performance management and appraisal, and career planning. These programs allow an organization to create or adapt a glossary of competencies with levels, to use the competencies to create profiles of requirements for each position, and to assess individuals against their own or any other job profile.

Using these programs usually requires significant preparation, especially if an organization wants to include technical skills as part of the profiles for each job. Meetings need to be organized in each functional area to define the technical skills needed in each function. Then each job needs to be analyzed, to identify the technical and non-technical skills and competencies and their required levels for each job.

In the work reported on in this report, a software model was not used; instead interviews provided the basis for the identification of competencies for each job analyzed. Thus, the competencies and the models developed for this project were specific to the water field. Using a software package would not provide competencies developed specifically for the water field and for the twelve positions for which models were developed.

One advantage of software programs is that they allow easy, paperless management of job requirements and assessments. But the success of the programs depends on getting people to regularly and consistently use the computerized management systems. This can be a challenge because people are reluctant to devote the required time to the ongoing activities required by the systems.
CHAPTER 6: USING COMPETENCY MODELS TO PLAN THE TRAINING AND DEVELOPMENT OF JOBHOLDERS

Competency models can be a powerful tool when used in developing training and development strategies of jobholders. Ways to use this approach are described in this chapter.

INTRODUCTION

One of the most common uses for a competency model is in guiding the training and development of jobholders. The competency model identifies the skills and personal qualities that are needed for effective and superior performance in the job. It therefore specifies areas for the training and development of jobholders.

In the case of the twelve competency models developed for this Water Research Foundation Project, the technical and non-technical competencies in the main part of the competency model are the ones for training and development focus. These are the competencies that jobholders will need to develop or strengthen. The Foundational Competencies listed are not the focus for training and development going forward, since they will have been developed by almost all employees before entry into the position.

WAYS TO DEVELOP COMPETENCIES OF INDIVIDUAL JOBHOLDERS

There are essentially three ways to develop competence for any particular job, in addition to on-the-job experience:

• Formal training courses
• Self-development using professional development plan
• Coaching by a manager or mentor

We describe these here, and also offer an approach for you to use in creating a training and development program for your employees that works with in-house and/or external resources.

Formal Training Courses to Develop Competencies

One way to develop competencies is to send jobholders to training courses that provide instruction in knowledge and skills needed to perform specific job responsibilities. Courses may be offered on or off-site and by the company’s own instructors or by vendors. Some courses use a classroom format, while others are provided to individuals working at a computer. Training courses are the primary means for developing technical competencies and are also commonly used to develop basic computer skills and skills for certain job roles, such as managing people, selling, and providing customer service.
Self-Development Using Professional Development Plans

Training is not the only way to develop competencies. An alternative approach is to create a program in which jobholders create professional development plans and then work at these plans individually to develop specific competencies. In this approach, jobholders and their managers are often provided with a resource guide, organized by competencies, that suggests many different activities designed to develop each competency. The types of activities include:

- Reading specific books or articles
- Taking self-study courses
- Performing suggested activities to practice using the competency
- Observing people who have mastered the competency
- Interviewing experts in the competency to learn their approaches
- Having your manager or a colleague observe you in a situation where you attempt to use the competency and then provide feedback
- Attending meetings or events where you can observe and practice the competency
- Taking classroom courses aimed at developing the competency

Professional development plans are best developed by jobholders and their managers, who consult in the creation of the personal development plans and can provide coaching and support to the jobholders in their developmental activities.

Using Coaching to Develop Competencies

Another way to develop competencies is provide coaching to job holders on specific competencies. Coaching can be provided by the supervisor on-the-job, as well as by professionals or co-workers, and can address technical, personal and leadership and managerial competencies.

*Coaching by the jobholder’s supervisor* is a powerful way to develop competencies for several reasons. First, the supervisor is knowledgeable about the jobholder’s performance level on entering the job. Second, the supervisor is often in a position to observe the jobholder’s performance over time and can offer “just-in-time” feedback and support. Third, the supervisor can change job assignments for the jobholder in order to support development is specific areas.

*Coaching by professional coaches* is most frequently used for competencies that involve difficult-to-learn behaviors, for example, in the areas of leadership (e.g. Influencing Skills) as well as for individual competencies such as Flexibility and Adaptability. Coaching assignments can last from a few days to a few months. Because coaching by external professionals can be costly, it is often limited to jobholders in positions of leadership and management.
COMPETENCY-BASED TRAINING AND DEVELOPMENT APPROACHES FOR YOUR ORGANIZATION

Using a Competency Model as a Basis for Assessing Available Training

An initial step in planning competency development programs for a particular job is to compare the main technical and non-technical competencies in the competency model with the curriculum of available courses for the jobholders. To do this, you will need the competency model and outlines of the courses currently offered to jobholders.

Create a table in Word or Excel using a format like the one below:

<table>
<thead>
<tr>
<th>Competencies for Job</th>
<th>Title of Course A</th>
<th>Title of Course B</th>
<th>Title of Course C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Competency 1 Name</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Competency 2 Name</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Competency 3 Name</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Etc.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In the table’s open cells, enter codes like the symbols on the left, with their meaning shown below.

<table>
<thead>
<tr>
<th>Code</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>CF</td>
<td>Competency is fully and effectively addressed</td>
</tr>
<tr>
<td>CP</td>
<td>Competency is partly addressed</td>
</tr>
<tr>
<td>0</td>
<td>Competency is not addressed</td>
</tr>
</tbody>
</table>

After completing the matrix, prepare a list of the job competencies and aspects (or behavioral indicators) of competencies that are not addressed. For one example, you may want to develop the competency of Concern for Effectiveness, focusing on the aspect “Develops ways to speed or automate routine or repeated processes” (from Competency Glossary, Appendix B).

Once you have completed this list, you can use it to plan ways to develop these competencies and aspects of competencies. For example, you could:

- Identify additional courses that provide training in the unaddressed and partly addressed competencies and add these courses to the training plan for jobholders
- Modify or add to the curriculum of an existing course, so that it addresses additional competencies or aspects of competencies
- Arrange for the development of a new course to address one or more competencies that are not sufficiently addressed in existing courses
- Plan to develop some of the insufficiently addressed competencies by having jobholders create and implement personal development plans

The steps that you identify should be considered for inclusion in a Training Development and Acquisition Plan for the Department in which the job is located.
Creating a Training Plan for Jobholders

Once you have identified a set of existing and planned courses for jobholders, you will need to prepare a table like the one below, to track the progress of jobholders in completing the set of planned courses.

<table>
<thead>
<tr>
<th>Jobholders</th>
<th>Course A</th>
<th>Course B</th>
<th>Course C</th>
<th>Course D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sandy Beech</td>
<td>MAY 2011</td>
<td>DEC 2009</td>
<td>FEB 2010</td>
<td>JUL 2010</td>
</tr>
<tr>
<td>Etc.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note that in the table above, courses that have not been completed yet are shown in parentheses.

CREATING A PROFESSIONAL DEVELOPMENT PROGRAM FOR YOUR ORGANIZATION

As noted earlier, in professional development programs jobholders work on their own, with the support of their managers, to carry out activities designed to develop a few, targeted competencies. The typical components of a professional development program include:

- A tool for assessing jobholders on the competencies identified for their job
- A development planning form on which to write two or three competencies targeted for development, a set of activities that the jobholder plans to complete, with the aim of developing or strengthening each targeted competency, and a resource guide with ideas for developing all or some of the competencies included in the competency model
- A prescribed process in which the jobholder and his/her manager independently assess the jobholder on the competencies for his/her job, discuss and agree on a small number of competencies to target for development, prepare a professional development plan, and periodically meet to review, discuss, and revise the plan

Professional development planning works best with well-educated, motivated employees, who are comfortable working on their own.

A Professional Development Planning Form can be found at the end of this section. Although it is possible to create customized and polished tools and documents to support this process, you can also do something simpler that is easy to implement, by following the steps below.

**Step 1. Select an Existing Resource Guide and Map It to the Competencies in the Job**

Here are three comprehensive resource guides to consider:
Carefully review the content of the resource guide you select, compare this content to the descriptions of the competencies in your competency model, and prepare a competency mapping table with a format like this:

<table>
<thead>
<tr>
<th>Competencies from Competency Model</th>
<th>Related Competencies in Resource Guide</th>
<th>Pages from Resource Guide</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

None of the suggested resource guides includes technical competencies, so you will only be able to map the non-technical ones. When you have identified a resource guide to use, purchase a copy of it for each jobholder.

Step 2. Prepare Instructions for Using a Copy of the Competency Model as a Crude Assessment Tool

The instructions, which will be used by each jobholder and his/her manager, might say:

1. Enter the following information:
   a. Name of Jobholder Being Assessed: _______________________
   b. Jobholder’s Job Title: _________________________________
   c. Your Name: _________________________________________

2. Read the description of each of the main competencies in the competency model, on pages ___.

3. Next to each competency, write one of these codes:
   a. E Excellent
   b. G Good
   c. DODevelopment Opportunity

4. Based on your ratings, identify two or three of the competencies that the jobholder should consider targeting for development:
   a. ______________________
   b. ______________________
   c. ______________________

Attach the instruction sheet to a copy of the competency model.

Step 3. Prepare Instructions for the Overall Process of Professional Development Planning

The instructions might use or adapt the following language:
1. Jobholder and his/her manager should set a date for a development planning meeting.
2. Prior to the meeting, the jobholder and his/her manager should each individually assess the jobholder on the main competencies for the job, using a copy of the competency model with the assessment instructions attached.
3. At the development planning meeting, the jobholder and his/her manager should:
   a. Share and discuss their assessments of the jobholder on the competencies
   b. Identify two or three competencies for the jobholder to target for development
   c. Use the selected resource guide and the mapping table to identify several possible actions that the jobholder might take to develop each targeted competency
   d. Identify projects or on-the-job activities to practice and strengthen targeted technical competencies which are not included in the resource guide
   e. Enter the selected actions on the Development Planning Form attached to these instructions
4. Following the development planning meeting, the jobholder should review and revise the draft professional development plan and submit it to his/her manager within 48 hours.
5. The manager and jobholder should agree on any revisions to the professional development plan and then sign it.
6. Every three to six months the jobholder and manager should meet to review progress against the development plan and update the plan by adding new developmental activities or new targeted competencies.
PROFESSIONAL DEVELOPMENT PLAN

<table>
<thead>
<tr>
<th>Jobholder’s Name:</th>
<th>Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Job Title</th>
<th>Jobholder’s Manager:</th>
</tr>
</thead>
<tbody>
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<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Jobholder’s Signature:</th>
<th>Manager’s Signature:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Complete the sections below for two or three targeted competencies.

First Competency Targeted for Development: ____________________

<table>
<thead>
<tr>
<th>Activities to Develop This Competency</th>
<th>Planned Completion Date</th>
<th>Actual Completion Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

Second Competency Targeted for Development: ____________________

<table>
<thead>
<tr>
<th>Activities to Develop This Competency</th>
<th>Planned Completion Date</th>
<th>Actual Completion Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Third Competency Targeted for Development: ____________________

<table>
<thead>
<tr>
<th>Activities to Develop This Competency</th>
<th>Planned Completion Date</th>
<th>Actual Completion Date</th>
</tr>
</thead>
<tbody>
<tr>
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</tbody>
</table>
CHAPTER 7:
SUMMARY

This report presents twelve models that were developed for twelve mission critical positions in the water sector. The models can be used by managers to better articulate the type of competencies that are needed for effective and superior performers in these jobs. The models can then be used to improve the selection process, the career development and training of these personnel. Various competencies, both technical and non-technical are needed to effectively perform jobs, and some are needed to perform the job in a superior way. Figure 7.1 shows how these competencies are important in performing a job effectively and for performing it in a superior manner.

The use of these models however, represents a considerable investment in management and human resource personnel time and commitment. It is very important that a manager wanting to use these models receives the support of management for the project.

A website was developed where these models can be downloaded electronically, as well as the materials provided in this report on adapting and developing new models and on their use for training. The Competency Glossary that was developed in this work is available in Appendix B and from the Water Utility Workforce Needs Website.

Which types of competencies are important, and for what outcomes?

<table>
<thead>
<tr>
<th>Foundational Competencies</th>
<th>Selection/promotion into job</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technical Competencies</td>
<td>Performance of technical responsibilities and tasks</td>
</tr>
<tr>
<td>Non-Technical Competencies: (Thinking, Task Achievement)</td>
<td>Performance of non-technical responsibilities and tasks</td>
</tr>
<tr>
<td>Non-Technical Competencies: (Interpersonal and Influence)</td>
<td>Solving highly challenging technical problems</td>
</tr>
<tr>
<td>Non-Technical Competencies: (Motivational)</td>
<td>Coping with highly challenging situations involving people</td>
</tr>
<tr>
<td></td>
<td>Meeting challenging quantitative performance goals</td>
</tr>
</tbody>
</table>

*Note: light blue = effective performance, dark blue = superior performance.*

Figure 7.1 Importance of competencies in job performance
This Chapter describes the competency models that were developed during this project.

- Water Treatment Plant Operator .......................................................... 71
- Distribution System Operator .............................................................. 75
- Process Control Specialist ................................................................. 80
- Water Operations Supervisor .............................................................. 85
- Facilities Maintenance Mechanic Technician ...................................... 91
- Instrument Technician ........................................................................ 96
- Distribution System Operations Supervisor ........................................ 101
- Foreman/Crew Leader ........................................................................ 107
- Water Quality Specialist .................................................................... 114
- Customer Service Representative (Office) .......................................... 121
- Laboratory Technician ....................................................................... 125
- Project Engineer ............................................................................... 129

GENERAL STRUCTURE OF THESE COMPETENCY MODELS

The structure of the models developed for this project includes competencies in four areas: Foundational (both technical and nontechnical), Technical Competencies, Nontechnical Competencies and Competencies needed for Superior Performance. Also included in these models is a list of major job responsibilities that were defined as the basis for the models. The major responsibilities of these jobs could vary from utility to utility. But, for this work, it was assumed that the responsibilities were those shown in the model and so they are included as a point of reference.

The Foundational, Technical and Nontechnical Competencies for each job were determined based on interviews with job holders and their managers. The Competencies needed for Superior Performance were drawn from those competencies but were specified by distinct behaviors. Utilities need to have technical competencies (to plan training activities and manage technical career ladders), and so the required technical competencies in these models are described in considerable detail, so that they will be useful for these purposes.

But non-technical competencies are also important, both for effective performance of main responsibilities and for superior performance. In identifying the non-technical competencies for each job, the following principles were applied:

- This set of competencies was kept small, so that jobholders would be able to focus on a few things that are important.
- The conceptual framework provided by the Water Sector Competency Model was used where possible, since this on-line competency glossary is already in use in the industry.
Often the same competency was used in more than one job, but defined behaviorally in terms that differ from one job to another. The goal is to promote use of a common conceptual framework in the industry, while allowing flexibility to define each competency behaviorally in ways that highlight the different requirements of specific jobs.

Competency definitions – technical, nontechnical, and foundational can be found in the Competency Glossary in Appendix B.
Note: This is a generic competency model encompassing a broad segment of water treatment operators. The required competencies for the described position vary greatly from system to system and even within a single utility. The description covers employees who may perform their duties on an individual rather than a team basis. Therefore, water systems should carefully consider which of the competencies are needed in any specific job similar to this one in their own organization.

I. Technical Competencies

1. Water Treatment Principles and Practices
   Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:
   a. Function of water treatment systems and plant unit processes
      1. What to monitor and how to control the process
      2. Process equipment and chemicals used in treatment
      3. Effects of changes in water treatment on water quality
      4. Effects of water quality changes on water treatment processes
      5. Principles of filter operation
   b. Regulations relevant to the operation and performance of the water treatment process and the duties of the operator’s position
   c. Obtaining and understanding information shown on SCADA screens and using the information to adjust processes
   d. Understanding and/or performing basic maintenance procedures for filters, pumps and other water treatment plant equipment
   e. Collecting water samples, completing basic analyses using standard water testing procedures, interpreting the test results, and making process adjustments based on those interpretations
   f. Performing emergency operating procedures for the treatment plant
   g. Performing safety requirements and procedures

2. System-Specific Expertise (In-Depth Expertise)
   Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:
   a. Treatment processes used at Jobholder’s facility (In-depth Expertise)
   b. Organization of the facility

3. Hydraulics (Basic Expertise)

II. Non-Technical Competencies

1. Conscientiousness
   a. Demonstrates commitment to public service and public health
   b. Adopts a daily routine to ensure timely completion of regular tasks
c. Sets appropriate priorities for tasks
d. Regularly monitors SCADA or other computerized systems to identify trends, detect emerging problems, and prescribe future tasks
e. Follows standard, prescribed approaches, schedules and protocols for completing regular tasks, such as water sampling, testing, and maintaining equipment
f. Regularly conducts visual inspection of equipment and processes; does not rely only on technical systems
g. Keeps self-alert, vigilant, and focused on the job
h. Collects additional data for verification, when tests or observations indicate an emerging problem
i. Completes required documentation of work activities, observations and test results in an accurate and timely way
j. Responds to alarms and developing problems with appropriate urgency
k. Looks beyond others’ stated needs in order to add value where appropriate

2. Information Sharing
   a. Promptly notifies supervisor and chain of command, when appropriate, about emerging problems
   b. Consistently keeps personnel on other shifts and affected work units informed about ongoing water treatment processes and problems
   c. Asks for information and help from other knowledgeable plant personnel when appropriate
   d. Asks questions of other operating staff to clarify recent and ongoing water treatment activities and problems

3. Critical and Analytical Thinking
   a. Identifies inconsistent or missing information
   b. Is able to deal with multiple variables when analyzing a problem
   c. Critically analyzes, compares, and interprets information
   d. Draws conclusions from relevant information
   e. Tests hypotheses to ensure that a problem is correctly diagnosed and that the best solution is found
   f. Approaches a complex task by breaking it down into a series of steps
   g. Identifies many alternative possible causes for a problem
   h. Assesses and integrates multiple data points in a situation, to determine an appropriate course of action

4. Working Independently
   a. Is able to work alone, without close supervision
   b. Is able to make decisions in own area of responsibility, without relying on a supervisor, but understands the point at which it is necessary to contact a supervisor
   c. Takes initiative in identifying and completing necessary tasks
Appendix A: Competency Models for Twelve Water Industry Positions | 73

III. Foundational Competencies (Mostly expected on entry into the position)

1. Technical Foundational Competencies
   a. Mathematics (Basic Expertise), including unit conversions and the metric system
   b. Science (Basic Expertise), including Chemistry and Biology
   c. Mechanical ability (Basic Expertise)
   d. Computer skills (Basic Expertise), including internet searching, email communication, Microsoft Office applications
   e. Electricity and electronics (Basic Expertise)
   f. Ability to read and interpret technical manuals and technical drawings.

2. Non-Technical Foundational Competencies
   a. Reading: Ability to understand written material and to use written material to find information needed in one’s job
   b. Listening: Attending carefully to others in order to understand what they are saying
   c. Oral Communication: Speaking English well enough and clearly enough to be understood by supervisors, co-workers and customers
   d. Written Communication: Ability to express oneself clearly in writing
   e. Following Directions: Receiving, understanding, and carrying out assignments or following Standard Operating Procedures with minimal supervision
   f. Ability to Learn: Incorporating classroom and on the job training into work performance
   g. Professionalism: Maintaining a professional presence and adhering to ethical standards
   h. Dependability and Reliability: Displaying responsible behavior at work

IV. Most Important Responsibilities

Note: Although job responsibilities are not part of a competency model, they are presented here because they helped to guide the selection of competencies.

1. Monitor, evaluate and adjust treatment processes
2. Conduct process control lab analyses
3. Assure compliance with regulations
4. Maintain and operate filters and equipment including minor maintenance
V. Competencies for Superior Performance

Note: Sections I and II presented the technical and non-technical competencies needed for effective performance in the job. But which competencies lead to superior performance? This section (V) presents a sub-set of the competencies and their behavioral indicators that are thought to be the most important to superior performance. The selection is based on a review of the interview data -- especially responses to questions about the most challenging situations encountered in the job and the skills and personal characteristics needed to dealing with these situations – and on experience working with and observing superior performers.

The numbering of the competencies and their behavioral indicators is not the same as that used in Sections I and II, as they are presented in relative order of importance.

1. Conscientiousness
   a. Demonstrates commitment to public service and public health
   b. Regularly monitors SCADA or other computerized systems to identify trends, detect emerging problems, and prescribe future tasks
   c. Follows standard, prescribed approaches, schedules and protocols for completing regular tasks, such as water sampling, testing, and maintaining equipment
   d. Keeps self-alert, vigilant, and focused on the job

2. Water Treatment Principles and Practices
   Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:
   a. Function of water treatment systems and plant unit processes
   b. Regulations relevant to the operation and performance of the water treatment process and the duties of the operator’s position

3. Critical and Analytical Thinking
   a. Is able to deal with multiple variables when analyzing a problem
   b. Draws conclusions from relevant information

4. Working Independently
   a. Is able to make decisions in own area of responsibility, without relying on a supervisor, but understands the point at which it is necessary to contact a supervisor
   b. Takes initiative in identifying and completing necessary tasks
Note: This is a generic competency model encompassing a broad segment of distribution system operators. The required competencies for the described position vary greatly from system to system and even within a single utility. The description covers employees who may perform their duties on an individual rather than a team basis. Therefore, water systems should carefully consider which of the competencies are needed in any specific job similar to this one in their own organization.

I. Technical Competencies

1. Water Distribution Systems
   Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:
   a. Operating, calibrating, maintaining, trouble-shooting and diagnosing system-specific infrastructure components and equipment
   b. Function of water mains, hydrants, valves and other appurtenances
   c. Collecting water samples, conducting basic tests using standard water testing procedures, and interpreting the test results
   d. Electrical and mechanical principles underlying system infrastructure operations (Basic Expertise)
   e. Hydraulic and pneumatic principles, fluid characteristics, pressure zones and use of control systems (Basic Expertise)
   f. Cross connections and approved backflow methods and devices
   g. Main flushing procedures
   h. Performing system-specific storage tank turnover operations
   i. Performing start-up and shut-down operations
   j. Using system-specific materials and equipment in the distribution system
   k. Following emergency operating procedures applicable to the system
   l. Following regulatory requirements that affect the operation and maintenance of the distribution system

2. Reading Plats, Maps, Plans and Drawings
   Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:
   a. Obtaining information to locate, and plan work activities
   b. Geographical Information Systems (GIS) (Basic Expertise)

3. Safety Requirements and Procedures
   Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:
   a. Ensuring that system-specific safety requirements are followed
4. Water Quality Problems

Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:

a. Recognizing basic water quality problem indicators such as taste, odor, turbidity, and color
b. Taking appropriate measures to address the problems

II. Non-Technical Competencies

1. Conscientiousness

a. Follows standard, prescribed approaches and protocols for completing regular tasks, such as opening and closing valves, conducting repairs, water sampling, testing, and maintenance of equipment
b. Ensures that safe procedures are followed
c. Available 24/7 to solve emergency issues
d. Completes required documentation of work activities, observations and test results in an accurate and timely way
e. Plans work carefully in advance
f. Demonstrates commitment to public service and public health

2. Information Sharing

a. Clearly communicates with contractors and other members of the crew
b. Clearly communicates to customers what will be done and when and how they will be affected
c. Gives customers advance notice, to the extent practicable, when their water service will be affected
d. Collaborates with other operating units within the utility as well as external stakeholders

3. Planning, Organizing and Scheduling

a. Prioritizes various competing tasks and performs them quickly and efficiently according to their urgency
b. Plans and assigns tasks so that jobs are completed on time
c. Anticipates obstacles to project completion and develops contingency plans to address them
d. Determines which equipment, materials, supplies, etc., are needed to complete the assignment and arranges to have them on hand or obtained in a timely manner

4. Critical and Analytical Thinking

a. Identifies inconsistent or missing information
b. Critically analyzes, compares, and interprets information
c. Draws conclusions from relevant information
d. Tests hypotheses to ensure that a problem is correctly diagnosed and the best solution is found
e. Approaches a complex task by breaking it down into a series of steps
f. Identifies alternative possible causes for a problem

5. **Problem Solving and Decision Making**
   a. Takes ownership of water treatment plant problems in own area of responsibility and works through the problems until they are resolved
   b. Assumes accountability in own area of responsibility, involving chain-of-command in decisions only as necessary
   c. Considers a variety of perspectives when making day-to-day decisions
   d. Sees the big picture in addressing problems and issues
   e. Remains calm and thinks quickly during crises; takes a leadership role and involves others as needed to solve problems
   f. Handles multiple, concurrent emergencies and/or situations
   g. Displays sound judgment

6. **Interpersonal Skills**
   a. Demonstrates concern for others by being sensitive to their needs and feelings
   g. Shows understanding of others’ behavior by demonstrating appropriate responses
   h. Demonstrates flexibility and open mindedness when dealing with people of different backgrounds
   i. Keeps calm and controls own responses when dealing with angry customers
   j. Displays and encourages teamwork
   k. Learns and uses “public image” protocols for communicating with the public in a standard way about issues

III. **Foundational Competencies (Mostly expected on entry into the position)**

1. **Technical Foundational Competencies**
   a. Mechanical ability (Basic Expertise)
   b. Ability to use hand tools and power tools
   c. Safety awareness
   d. Science (Basic Expertise)
   e. Electricity (Basic Expertise)
   f. Mathematics (Basic Expertise), especially use of formulas

2. **Non-Technical Foundational Competencies**
   a. Listening: Attending carefully to others in order to understand what they are saying
   b. Oral Communication: Speaking English well enough and clearly enough to be understood by supervisors, co-workers and customers
   c. Written Communication: Ability to express oneself clearly in writing
   d. Following Directions: Receiving, understanding, and carrying out assignments or following Standard Operating Procedures with minimal supervision
   e. Ability to Learn: Incorporating classroom and on the job training into work performance
f. Professionalism: Maintaining a professional presence and adhering to ethical standards
g. Dependability and Reliability: Displaying responsible behavior at work
h. Flexibility and Adaptability: Openness to new and different ways of doing things; willingness to modify one’s preferred way of doing things
i. Teamwork: The ability to participate and work with others as part of a team

IV. Most Important Responsibilities

Note: Although job responsibilities are not part of a competency model, they are presented here because they helped to guide the selection of competencies.

1. Oversee equipment (pipes, hydrants, valves, etc.) repair, replacement and rehab
2. Monitor, evaluate and adjust disinfection and collect water quality samples
3. Flush mains and hydrants as required
4. Respond to and resolve customer complaints and maintain good customer relations (On-site in the field as the situation requires but not in the capacity of a full-time customer service representative)

V. Competencies for Superior Performance

Note: Sections I and II presented the technical and non-technical competencies needed for effective performance in the job. But which competencies lead to superior performance? This section (V) presents a sub-set of the competencies and their behavioral indicators that are thought to be the most important to superior performance. The selection is based on a review of the interview data -- especially responses to questions about the most challenging situations encountered in the job and the skills and personal characteristics needed to dealing with these situations – and on experience working with and observing superior performers.

The numbering of the competencies and their behavioral indicators is not the same as that used in Sections I and II, as they are presented in relative order of importance.

1. Conscientiousness
   a. Demonstrates commitment to public service and public health
   b. Follows standard, prescribed approaches and protocols for completing regular tasks, such as opening and closing valves, conducting repairs, water sampling, testing, and maintenance of equipment
   c. Ensures that safe procedures are followed
2. **Planning, Organizing, and Scheduling**
   a. Prioritizes various competing tasks and performs them quickly and efficiently according to their urgency
   b. Anticipates obstacles to project completion and develops contingency plans to address them

3. **Problem Solving and Decision Making**
   a. Takes ownership of problems in own area of responsibility and works through the problems until they are resolved
   b. Sees the big picture in addressing problems and issues
   c. Remains calm and thinks quickly during crises; takes a leadership role and involves others as needed to solve problems
   d. Handles multiple, concurrent emergencies and/or situations

4. **Interpersonal Skills**
   a. Keeps calm and controls own responses when dealing with angry customers
   b. Displays and encourages teamwork
   c. Learns and uses “public image” protocols for communicating with the public in a standard way about issues
Note: This is a generic competency model encompassing a broad segment of process control specialists. The required competencies for the described position vary greatly from system to system and even within a single utility. The description covers employees who may perform their duties on an individual rather than a team basis. Therefore, water systems should carefully consider which of the competencies are needed in any specific job similar to this one in their own organization.

I. Technical Competencies

1. Process Control System for Water Treatment at Jobholder’s Facility
   Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:
   a. Understanding what the operator monitors, the goals of the process, and how he/she controls process
   b. Process equipment used in the treatment and distribution systems (Basic Expertise)
   c. Tracking regulatory parameters used for process control
   d. Considering alarm trigger points in use by operating personnel

2. Supervisory Control and Data Acquisition Systems (SCADA) and Other Related Systems Used in Water Treatment and Distribution (In-Depth Expertise)
   Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:
   a. Designing and configuring systems within a network platform, including consideration of switches, routers, and firewalls
   b. Supporting, operating, and maintaining the systems, processes and technology
   c. Configuring/programming the system to integrate new process control functions

3. Sub-Systems and Languages Comprising a SCADA and Other Water Treatment Technology Systems, how they interact and maintaining and upgrading them as required (In-Depth Expertise)
   Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:
   a. Programmable logic controllers (PLCs)
   b. Remote terminal units (RTUs)
   c. Human machine interface (HMI)
   d. Computer data acquisition system
   e. Communication pathways
   f. Understanding the interactions among the sub-systems and languages
   g. Maintaining the sub-systems and languages
   h. Upgrading the sub-systems and languages
4. System-Specific Expertise (In-depth)

*Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:*

a. Intranet/server system, devices, and security  
b. Software systems used, including process control languages, databases, spreadsheets and word processing  
c. Instrumentation and communications  
d. Safety requirements and procedures

5. Troubleshooting SCADA and Other Technology Systems  
(In-Depth Expertise)

II. Non-Technical Competencies

1. Conscientiousness

a. Demonstrates commitment to public service and public health  
b. Follows standard, prescribed approaches and protocols for completing regular tasks  
c. Completes required documentation of work activities and work products in an accurate and timely way  
d. Checks own work to ensure accuracy  
e. Keeps self alert, vigilant, and focused on the job  
f. Attends to details when appropriate  
g. Looks beyond others’ stated needs in order to add value where appropriate

2. Systems Thinking

a. Approaches work in the context of an entire process, including the role of each of its component parts  
b. Manages the relationships among the different components of a complex system  
c. Anticipates the effects of changes in one part of a complex system on other parts of the system and on the overall process  
d. Is able to see the big picture when considering a problem

3. Information Sharing

a. Seeks out and questions operating personnel to clarify the need or problem to be addressed and the type of solution that is appropriate  
b. Keeps operators and others informed about plans and activities for addressing problems affecting them  
c. Maintains continual communication with plant personnel affected by his/her activities and projects.  
d. Maintains open communications with all levels of employees throughout the plant
4. Planning, Organizing, and Scheduling
   a. Considers how technology systems (e.g. SCADA) can interact with other utility-specific computer applications such as preventative maintenance programs
   b. Prioritizes various competing tasks and performs them quickly and efficiently according to their urgency
   c. Estimates resources needed for project completion; allocates time and resources effectively
   d. Anticipates obstacles to project completion and develops contingency plans to address them
   e. Takes necessary corrective action when projects go off-track
   f. Plans and schedules tasks so that work is completed on time
   g. Keeps track of details to ensure work is performed accurately and completely
   h. Responds to the schedules of others affected by arrangements; recognizes problems, generates effective alternatives, and takes corrective action
   i. Is able to multi-task

5. Critical and Analytical Thinking
   a. Approaches a complex task by breaking it down into a sequence of smaller tasks
   b. Notices discrepancies and inconsistencies in available information
   c. Identifies missing or needed information and the means to obtain it
   d. Identifies alternative causes for a problem including most likely cause(s)
   e. Sets up experimental comparisons in which all conditions but one are kept the same, in order to determine whether the single varying condition causes a different result
   f. Uses a step-by-step, logical process to rule out possible causes of a problem and identify its underlying cause
   g. Assesses and integrates multiple data points in a situation, to determine an appropriate course of action
   h. Spots opportunities for using technology in new ways

6. Learning Orientation
   a. Demonstrates interest in learning about new technologies
   b. Actively seeks and completes training to enhance technical skills and to keep up to date with new water systems technology

7. Interpersonal Skills
   a. Demonstrates concern for others by being sensitive to their needs and feelings
   b. Shows understanding of others’ behavior by demonstrating appropriate responses
   c. Periodically summarizes what he/she has heard, to demonstrate listening and to check that he/she has correctly understood what the other person has said
   d. Seeks and obtains buy-in from operators
   e. Demonstrates flexibility and open mindedness when dealing with a wide range of people
f. Stays calm under pressure or in emergency situations

g. Collaborates with other operating units within the utility

III. Foundational Competencies (Mostly expected on entry into the position)

1. Technical Foundational Competencies
   a. Computer Skills: Comprehensive knowledge of computer applications, including databases, spreadsheets, and word processing
   b. Control System Platforms (PLCs, RTUs)
   c. Process and Instrumentation Diagrams (P&IDs) and Loop Diagrams
   d. Network Architecture
   e. Electronics (Basic Expertise)
   f. Pneumatics (Basic Expertise)
   g. Electricity (Basic Expertise)
   h. Safety Awareness

2. Non-Technical Foundational Competencies
   a. Oral Communication: Ability to communicate complex ideas in speaking at an appropriate level to be understood by supervisors, co-workers and customers
   b. Listening: Attending carefully to others in order to understand what they are saying
   c. Reading: Ability to understand written material and to use written material to find information needed in one’s job
   d. Written Communication: Ability to express oneself clearly in writing, including technical documentation
   e. Following Directions: Receiving, understanding, and carrying out assignments or following Standard Operating Procedures with minimal supervision
   f. Ability to Learn: Incorporating classroom and on the job training into work performance
   g. Professionalism: Maintaining a professional presence and adhering to ethical standards
   h. Dependability and Reliability: Displaying responsible behavior at work

IV. Most Important Responsibilities

Note: Although job responsibilities are not part of a competency model, they are presented here because they helped to guide the selection of competencies.

1. Write or modify SCADA programming

2. Troubleshoot operational problems possibly related to SCADA software/programming

3. Document logic and coding for all new or changed programming

4. Provide data as needed to operations and to other personnel as requested

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V. Competencies for Superior Performance

Note: Sections I and II presented the technical and non-technical competencies needed for effective performance in the job. But which competencies lead to superior performance? This section (V) presents a sub-set of the competencies and their behavioral indicators that are thought to be the most important to superior performance. The selection is based on a review of the interview data -- especially responses to questions about the most challenging situations encountered in the job and the skills and personal characteristics needed to dealing with these situations – and on experience working with and observing superior performers.

The numbering of the competencies and their behavioral indicators is not the same as that used in Sections I and II, as they are presented in relative order of importance.

1. Systems Thinking
   a. Approaches work in the context of an entire process, including the role of each of its component parts
   b. Anticipates the effects of changes in one part of a complex system on other parts of the system and on the overall process
   c. Is able to see the big picture when considering a problem

2. Critical and Analytical Thinking
   a. Approaches a complex task by breaking it down into a sequence of smaller tasks
   b. Identifies alternative causes for a problem including most likely cause(s)
   c. Uses a step-by-step, logical process to rule out possible causes of a problem and identify its underlying cause
   d. Spots opportunities for using technology in new ways

3. Conscientiousness
   a. Follows standard, prescribed approaches and protocols for completing regular tasks
   b. Keeps self-alert, vigilant, and focused on the job
   c. Demonstrates commitment to public service and public health

4. Supervisory Control and Data Acquisition Systems (SCADA) and Other Related Systems Used in Water Treatment and Distribution (In-Depth Expertise)
   Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:
   a. Designing and configuring systems within a network platform, including consideration of switches, routers, and firewalls
   b. Supporting, operating, and maintaining the systems, processes and technology
Note: This is a generic competency model encompassing a broad segment of water operations supervisors. The required competencies for the described position vary greatly from system to system and even within a single utility. The description covers employees who may perform their duties on an individual rather than a team basis. Therefore, water systems should carefully consider which of the competencies are needed in any specific job similar to this one in their own organization.

I. Technical Competencies

1. Water Treatment Principles and Practices (In-Depth Expertise)
   Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:
   a. Water treatment systems and plant unit processes
      1. What to monitor and how to control the process
      2. Process equipment and chemicals used in treatment
      3. Effects that changes in water treatment have on water quality
      4. Effects of water quality changes on water treatment processes
      5. Principles of filter operation
   b. Obtaining and interpreting information shown on whole systems technology (e.g. SCADA) screens and using the information to adjust processes
   c. Interpreting water sampling test results, and making process adjustments based on those interpretations
   d. Hydraulics (Basic Expertise)

2. System-Specific Expertise (In-depth Expertise)
   Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:
   a. Treatment processes used at Jobholder’s Facility (In-depth Expertise)
   b. Organization of the facility
   c. Ability to assume responsibility for emergency operating procedures for the treatment plant, including start-up and shut-down
   d. Safety requirements and procedures and the ability to assume responsibility for maintaining a safe working environment
   e. Regulations and related requirements relevant to the operation of the water treatment process
      1. Required sampling procedures and reporting requirements
      2. Ensuring that all staff understands the importance of consistent compliance with all regulations

3. Quality Control and Continuous Improvement
   Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:
a. Understanding of concepts, principles and methods used in quality control and continuous improvement
b. Applying quality control and continuous improvement processes used at the site
c. Ensuring application of standard operating procedures used at the site

4. Managing Human Resources issues and policies
   Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:
   a. Personnel policies and procedures
   b. Union contract terms, where appropriate
   c. Conflict resolution methods

II. Non-Technical Competencies

1. Learning Orientation
   a. Seeks out new assignments, procedures and technologies
   b. Works toward acquiring and maintaining certifications
   c. Applies material taught in the classroom and on-the-job training
   d. Recognizes when help is needed and seeks help from others
   e. Introduces new approaches and technologies into work unit

2. Conscientiousness
   a. Follows standard, prescribed approaches and protocols for completing regular tasks and for addressing emergency situations
   b. Ensures that employees are meeting prescribed approaches and protocols in their regular tasks
   c. Reviews logs for trends on a regular and timely basis
   d. Investigates situations promptly when logs and/or employees indicate an emerging problem
   e. Completes required documentation of work activities, observations and test results in an accurate and timely way
   f. Looks beyond stated needs in order to add value where appropriate
   g. Demonstrates commitment to public service and public health

3. Planning, Scheduling, and Organizing
   a. Reviews work flow cycles to estimate manpower needs
   b. Sets appropriate priorities for completion of tasks
   c. Establishes order of work flow to promote efficiency
   d. Fills open positions, including resume review, interviewing and hiring recommendations
   e. Makes personnel assignments, by considering both technical skills and personal styles, to support optimal performance
   f. Manages work schedules across shifts
   g. Reprioritizes work flow and personnel assignments as needed
h. Regularly monitors inventory, places orders and restocks supplies to support anticipated work flow
i. Balances multiple priorities while maintaining focus on plant mission

4. Problem Solving and Decision Making
   a. Takes ownership of water treatment plant upsets; displays tenacity for handling corrective measures
   b. Assumes accountability in own area of responsibility, involving chain-of-command in decisions only as necessary
   c. Considers a variety of perspectives when making day-to-day decisions
   d. Remains calm and thinks quickly during crises; takes a leadership role and involves others as needed to solve problems
   e. Handles multiple, concurrent emergencies and/or situations
   f. Displays sound judgment
   g. Balances urgency and safety in emergency situations
   h. Is able to see the larger picture when thinking about a problem or decision

5. Communication
   a. Actively listens and seeks to understand others: employees, colleagues, managers and customers
   b. Shares work-related information openly with employees and colleagues, yet maintains confidentiality where appropriate
   c. Effectively explains service interruptions and impacts of water problems to customers and other stakeholders
   d. Promptly notifies chain of command, when appropriate, about emerging problems
   e. Consistently keeps personnel on other shifts and in other units informed about ongoing water treatment processes and problems
   f. Asks for information and help from other knowledgeable plant personnel when appropriate
   g. Asks questions and shares information with other operating staff to clarify water treatment activities and problems

6. Managing Performance
   a. Provides clear instructions to employees regarding roles and tasks
   b. Shares and explains personnel policies and procedures to employees
   c. Treats employees fairly and logically, using a consistent set of performance standards
   d. Encourages employees to work together to achieve team goals
   e. Tracks progress of individual employee performance
   f. Provides specific, timely feedback on performance
   g. Provides instruction and coaching as needed to help employees improve performance
   h. Addresses conflicts among employees before they impact performance
   i. Applies progressive discipline procedures as needed
7. Interpersonal Skills
   a. Shows respect for others, regardless of position or level of authority
   b. Involves others when making decisions
   c. Remains calm under pressure, maintaining control over emotions
   d. Develops trust-based relationships with others
   e. Pays attention to customer needs, showing empathy during service interruptions and crisis situations
   f. Works cooperatively with other operating units within the utility

III. Foundational Competencies (Mostly expected on entry into the position)

1. Technical Foundational Competencies
   a. Mathematics (Basic Expertise)
   b. Chemistry
   c. Mechanical skills (Basic Expertise)
   d. Construction skills
   e. Plumbing skills
   f. Electrical and electronic skills (Basic Expertise)
   g. Reading blueprints, technical maps, and equipment specifications
   h. Computer Skills
      1. Internet search
      2. Email correspondence
      3. Excel spreadsheet data entry
      4. Microsoft Word applications
      5. Plant-specific and industry-specific applications

2. Non-Technical Foundational Competencies
   a. Integrity: Concern for consistently acting in an honest, ethical way
   b. Ability to Learn: Incorporating classroom and on-the-job training into work performance
   c. Flexibility and Adaptability: Openness to new and different ways of doing things; willingness to modify one’s preferred way of doing things
   d. Reading: The ability to understand written material and to use written material to find information needed in one’s job
   e. Oral Communication: Speaking English well enough and clearly enough to be understood by supervisors, co-workers, and customers
   f. Written Communication: The ability to express oneself clearly in writing
   g. Listening: Attending carefully to others in order to understand what they are saying
   h. Following Directions: Receiving, understanding, and carrying out assignments or following Standard Operating Procedures with minimal supervision
   i. Professionalism: Maintaining a professional presence and adhering to ethical standards
   j. Dependability and Reliability: Displaying responsible behavior at work
k. Critical and Analytical Thinking: The ability to break down a problem in order to understand it and to think logically and systematically when solving problems and making decisions

IV. Most Important Responsibilities

*Note:* Although job responsibilities are not part of a competency model, they are presented here because they helped to guide the selection of competencies.

1. Oversee all water treatment plant operations and maintenance
2. Prioritize and make work assignments
3. Ensure regulatory compliance
4. Address or resolve, where possible, employee work-related issues
5. Implement policies set forth by upper management or policy bodies
6. Oversee quality control and continuous improvement

V. Competencies for Superior Performance

*Note:* Sections I and II presented the technical and non-technical competencies needed for effective performance in the job. But which competencies lead to superior performance? This section (V) presents a sub-set of the competencies and their behavioral indicators that are thought to be the most important to superior performance. The selection is based on a review of the interview data -- especially responses to questions about the most challenging situations encountered in the job and the skills and personal characteristics needed to dealing with these situations – and on experience working with and observing superior performers.

The numbering of the competencies and their behavioral indicators is not the same as that used in Sections I and II, as they are presented in relative order of importance.

1. Conscientiousness
   a. Follows standard, prescribed approaches and protocols for completing regular tasks and for addressing emergency situations
   b. Ensures that employees are meeting prescribed approaches and protocols in their regular tasks
   c. Reviews logs for trends on a regular and timely basis
   d. Investigates situations promptly when logs and/or employees indicate an emerging problem
   e. Demonstrates commitment to public service and public health

2. Planning, Organizing, and Scheduling
   a. Sets appropriate priorities for completion of tasks
b. Manages work schedules across shifts  
c. Balances multiple priorities while maintaining focus on plant mission  

3. Managing Performance  
   a. Provides clear instructions to employees regarding roles and tasks  
   b. Treats employees fairly and logically, using a consistent set of performance standards  
   c. Provides instruction and coaching as needed to help employees improve performance  
   d. Addresses conflicts among employees before they impact performance  

4. System-Specific Expertise  
   Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:  
   a. Treatment processes used at Jobholder’s Facility (In-depth Expertise)  
   b. Organization of the facility  
   c. Ability to assume responsibility for emergency operating procedures for the treatment plant, including start-up and shut-down  
   d. Safety requirements and procedures and the ability to assume responsibility for maintaining a safe working environment  
   e. Regulations and related requirements relevant to the operation of the water treatment process  

5. Problem Solving and Decision Making  
   a. Considers a variety of perspectives when making day-to-day decisions  
   b. Remains calm and thinks quickly during crises; takes a leadership role and involves others as needed to solve problems
FACILITIES MAINTENANCE MECHANIC TECHNICIAN

Note: This is a generic competency model encompassing a broad segment of water facilities maintenance mechanic technicians. The required competencies for the described position vary greatly from system to system and even within a single utility. The description covers employees who may perform their duties on an individual rather than a team basis. Therefore, water systems should carefully consider which of the competencies are needed in any specific job similar to this one in their own organization.

I. Technical Competencies

1. Water Treatment / Distribution System Processes and Procedures (Basic Expertise)
   Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:
   a. How water treatment works
   b. Water treatment plant unit processes (filters, mixing chambers, etc.)
   c. Regulations affecting water treatment and distribution

2. Mechanical Systems Used In Water Utilities (In-Depth Expertise)
   Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:
   a. Pumps and motors
   b. Transport systems (hard pipe, tubing)
   c. Storage facilities – tanks, reservoirs

3. Machinery Preventive/Predictive Maintenance Procedures
   Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:
   a. Standard operating procedures
   b. Lubricating, inspections, gauge checking, vibration analysis and oil analysis

4. Equipment Repair Procedures
   Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:
   a. Recognizing malfunctioning equipment
   b. Disassembling and rebuild equipment
   c. Fabricating parts and tools for repairs
   d. Implementing manufacturer’s directions
   e. Troubleshooting malfunctions
   f. Using precision measuring tools
5. **Security and Safety Procedures**  
*Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:*

a. Personal safety equipment and procedures  
b. Federal (OSHA), State and local laws and regulations pertaining to hazardous materials  
c. Electrical and mechanical machinery and equipment protection  
d. Treatment plant emergency procedures and protocols  
e. Lock out/tag out procedure for safe operations  
f. Awareness of impact of actions on entire system

6. **Computer Skills**  
*Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:*

a. Internet Search  
b. E-mail communication  
c. Use of plant-specific preventative and maintenance management systems

II. **Non-Technical Competencies**

1. **Conscientiousness**
   
a. Follows standard, prescribed approaches and protocols / SOPs for completing regular tasks and for addressing emergency situations  
b. Reviews logs for trends on a regular and timely basis  
c. Completes required documentation of work activities, observations and test results in an accurate and timely way  
d. Stays aware and alert at all times  
e. Demonstrates reliability and dependability  
f. Identifies and suggests areas for improvement  
g. Keeps legible work records  
h. Demonstrates commitment to public service and public health

2. **Working Independently**
   
a. Is able to work alone, without close supervision  
b. Is able to make decisions in own area of responsibility, without relying on supervisor

3. **Critical and Analytical Thinking**
   
a. Identifies inconsistent or missing information  
b. Critically analyzes, compares, and interprets information  
c. Draws conclusions from relevant information  
d. Tests hypotheses to ensure that a problem is correctly diagnosed and that the best solution is found  
e. Approaches a complex task by breaking it down into a series of steps  
f. Identifies many possible causes for a problem
4. Planning, Organizing, and Scheduling  
   a. Uses work order system to obtain work assignments, schedule repairs and document repair activity and materials use  
   b. Regularly monitors inventory and notifies supervisor of equipment needs  
   c. Ensures parts and equipment are available and ready for installation  
   d. Manages time effectively  
   e. Thinks through the entire repair process, to ensure proper planning and execution  
   f. Coordinates own work with operations and other disciplines  

5. Problem-Solving and Decision Making  
   a. Investigates emerging problem situations promptly  
   b. Thinks quickly during crises, involving others, as needed, to solve problems  
   c. Displays sound judgment  
   d. Shows versatility in addressing a variety of problems  
   e. Identifies and uses creative approaches, when necessary, to making repairs  
   f. Balances urgency and safety in emergency situations  
   g. Demonstrates ingenuity and innovative thinking in problem solving  
   h. Demonstrates confidence in own abilities and judgment  
   i. Is able to view a problem in the context of the larger picture  

6. Communication  
   a. Keeps supervisor informed of work activities on a regular basis  
   b. Promptly notifies chain of command, when appropriate, about emerging problems  
   c. Consistently keeps personnel on other shifts and in other units informed about ongoing mechanical/hydraulic problems and problem solving approaches  
   d. Asks for information and help from other knowledgeable plant personnel, when appropriate  
   e. Asks questions of and shares information with other operating staff to clarify water treatment /mechanical activities and problems  

III. Foundational Competencies (Mostly expected on entry into the position)  

1. Technical Foundational Competencies  
   a. Mechanical Aptitude and Dexterity  
   b. Mathematics  
   c. Electrical skills  
   d. Reading Blueprints, Technical Documents, and Equipment Specifications  
   e. Computer skills (Basic Expertise)  
   f. Shop practices (Basic Expertise)  
   g. Hydraulic systems (Basic Expertise)
2. Non-Technical Foundational Competencies
   a. Dependability and Reliability: Displaying responsible behaviors at work
   b. Reading: The ability to understand written material and to use written material to find information needed in one’s job
   c. Written Communication: The ability to express oneself clearly in writing
   d. Listening: Attending carefully in order to incorporate information into work activities
   e. Oral Communication: Speaking English well enough and clearly enough to be understood by supervisors, co-workers, and customers
   f. Flexibility and Adaptability: Openness to new and different ways of doing things; willingness to modify one’s preferred way of doing things
   g. Following Directions: Receiving, understanding, and carrying out assignments or following Standard Operating Procedures with minimal supervision
   h. Ability to Learn: Incorporating classroom and on the job training into work performance
   i. Professionalism: Maintaining a professional presence and adhering to ethical standards
   j. Physical Strength: The ability to lift and carry heavy loads and to exert force with arms, legs, hands, and body
   k. Physical Dexterity: The ability to use fine motor coordination to operate tools

IV. Most Important Responsibilities

Note: Although job responsibilities are not part of a competency model, they are presented here because they helped to guide the selection of competencies.

1. Perform routine maintenance on mechanical system components in coordination with operations staff, and repair or install new mechanical system components

2. Record / document activities in work order maintenance management system, etc.

3. Coordinate functions with operational staff to assure that activities do not conflict with planned operational needs

4. Maintain inventory of critical parts/supplies to avoid interruption of operations

V. Competencies for Superior Performance

Note: Sections I and II presented the technical and non-technical competencies needed for effective performance in the job. But which competencies lead to superior performance? In this section (V) we present a sub-set of the competencies and their behavioral indicators that we believe are most important to superior performance. The selection is based on a review of the interview data -- especially responses to questions about the most challenging situations encountered in the job and the skills and personal characteristics needed to dealing with these situations – and on experience working with and observing superior performers.
The numbering of the competencies and their behavioral indicators is not the same as that used in Sections I and II, and they are presented in relative orders of importance.

1. **Mechanical Systems Used In Water Utilities (In-Depth Expertise)**
   *Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:*
   a. Pumps and motors
   b. Transport systems (hard pipe, tubing)
   c. Storage facilities – tanks, reservoirs

2. **Planning, Organizing and Scheduling**
   a. Prioritizes various competing tasks and performs them quickly and efficiently according to their urgency
   b. Anticipates obstacles to project completion and develops contingency plans to address them

3. **Conscientiousness**
   a. Follows standard, prescribed approaches and protocols / SOPs for completing regular tasks and for addressing emergency situations
   b. Completes required documentation of work activities, observations and test results in an accurate and timely way
   c. Stays aware and alert at all times
   d. Demonstrates reliability and dependability
   e. Identifies and suggests areas for improvement
   f. Demonstrates commitment to public service and public health

4. **Critical and Analytical Thinking**
   a. Critically analyzes, compares, and interprets information
   b. Draws conclusions from relevant information
   c. Approaches a complex task by breaking it down into a series of steps

5. **Problem Solving and Decision Making**
   a. Investigates emerging problem situations promptly
   b. Thinks quickly during crises, involving others, as needed, to solve problems
   c. Displays sound judgment
   d. Identifies and uses creative approaches, when necessary, to making repairs
   e. Balances urgency and safety in emergency situations
   f. Demonstrates ingenuity and innovative thinking in problem solving
   g. Demonstrates confidence in own abilities and judgment
   h. Is able to view a problem in the context of the larger picture
INSTRUMENT TECHNICIAN

Note: This is a generic competency model encompassing a broad segment of instrument technicians. The required competencies for the described position vary greatly from system to system and even within a single utility. The description covers employees who may perform their duties on an individual rather than a team basis. Therefore, water systems should carefully consider which of the competencies are needed in any specific job similar to this one in their own organization.

I. Technical Competencies

1. Water Treatment System / Distribution System
   Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:
   a. General understanding of how system works
   b. Using instruments and generating data
   c. Regulatory implications of data
   d. Application of analytical methods, instrument calibration frequencies, and documentation required by regulation

2. Water Treatment Systems Instrumentation
   Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:
   a. Process analytical instruments used in water plant and distribution system
   b. Suppliers and vendors of instruments and repair parts
   c. Programmable logic controllers (PLCs) (Basic knowledge)
   d. Performing routine maintenance, calibration and repair on instrumentation
   e. Understanding the role of each instrument in the whole water treatment process

3. Technology Communications Expertise
   Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:
   a. Devices (fiber optic, cable, cell phone, radio, satellite)
   b. Methods (Ethernet, internet)

4. Principles Used in Instrumentation
   Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:
   a. Hydraulics (Basic Expertise)
   b. Pneumatics (Basic Expertise)
   c. Electricity (In-depth Expertise)
5. Quality Control Procedures

Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:

a. Quality control procedures used in instrumentation
b. Obtaining precise, accurate measurements

II. Non-Technical Competencies

1. Critical and Analytical Thinking

a. Identifies inconsistent or missing information
b. Critically reviews, analyzes, synthesizes, compares and interprets information
c. Draws conclusions from relevant and/or missing information
d. Identifies all possible causes of a problem, from a systemic perspective
e. Tests possible hypotheses to ensure the problem is correctly diagnosed and the best solution is found
f. Uses a systematic approach to troubleshoot and pinpoint the causes of a problem
g. Uses scientific rules and methods to solve problems
h. Makes purchasing decisions by systematically comparing alternatives

2. Problem Solving and Decision Making

a. Questions operating personnel to better understand the problem
b. Gathers information from a variety of sources
c. Thinks clearly and systematically under pressure
d. Looks for practical ways to address problems
e. Is able to see the larger picture, when viewing a problem

3. Planning, Organizing, and Scheduling

a. Prioritizes various competing tasks and performs them quickly and efficiently according to their urgency
b. Allocates time and resources effectively
c. Plans and schedules tasks so that work is completed on time
d. Keeps track of details to ensure that work is performed accurately and completely

4. Information Sharing

a. Effectively communicates with all members of the team to achieve goals
b. Keeps all parties informed of progress and all relevant changes to project timelines
c. Works cooperatively with other operating units within the utility

5. Conscientiousness

a. Follows standard, prescribed approaches and protocols for completing regular tasks
b. Completes all required documentation of work activities, observations and tests in an accurate and timely way
c. Checks own work to ensure accuracy
d. Attends to details when appropriate

6. Learning Orientation
   a. Seeks to learn new procedures, technologies, and instruments
   b. Uses material taught in the classroom and on-the-job training in work situations
   c. Keeps up to date with developments in the instrumentation field

III. Foundational Competencies (Mostly expected on entry into the position)

1. Technical Competencies
   a. Electronics and Basic Electrical Systems
   b. Basic Computer Skills (hardware and software applications)
   c. Ability to read and interpret manuals and drawings
   d. Basic understanding of methods and practices used for the installation, calibration, maintenance, and repair of instrumentation equipment
   e. Safety Awareness: Compliance with the procedures necessary to ensure a safe and healthy work environment for the worker and the protection of instrumentation

2. Non-Technical Foundational Competencies
   a. Reading: knowing how to find information and identify essential information, and having the ability to comprehend manufacturer specifications
   b. Oral Communication: the ability to express complex ideas in English well enough to be understood by co-workers and managers
   c. Written Communication: the ability to express complex ideas in clear, written English
   d. Listening: Listening carefully in order to incorporate information into work activities
   e. Flexibility and Adaptability: Adjusting to changing work requirements, refocusing attention to new assignments quickly, and quickly demonstrating comfort with a new situation or assignment
   f. Following Directions: Receiving, understanding, and carrying out assignments with minimal supervision. Seeks additional assistance or direction as needed
   g. Ability to Learn: Incorporating classroom and on the job training into work performance, showing willingness to learn new assignments, procedures and technologies
   h. Professionalism: Taking pride in oneself and one’s work, and treating others with respect and courtesy
   i. Dependability and Reliability: Displaying responsible behavior at work, reports to work on time, and can be trusted when working alone
   j. Tenacity: Self-generated motivation to continue working on a task or problem until it is completed or resolved
IV. Most Important Responsibilities

1. Perform required QC / maintenance for on-line instrumentation
2. Troubleshoot communications and instrumentation problems
3. Requisition/purchase new or replacement equipment
4. Coordinate with work by outside contractors, consultants, etc.

V. Competencies for Superior Performance

Note: Sections I and II presented the technical and non-technical competencies needed for effective performance in the job. But which competencies lead to superior performance? This section (V) presents a sub-set of the competencies and their behavioral indicators that are considered to be the most important to superior performance. The selection is based on a review of the interview data -- especially responses to questions about the most challenging situations encountered in the job and the skills and personal characteristics needed to dealing with these situations -- and on experience working with and observing superior performers.

The numbering of the competencies and their behavioral indicators is not the same as that used in Sections I and II, as they are presented in relative order of importance.

1. Water Treatment Systems Instrumentation
   Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:
   a. Process analytical instruments used in water plant and distribution system
   b. Programmable logic controllers (PLCs) (Basic knowledge)
   c. Performing routine maintenance, calibration and repair on instrumentation
   d. Understanding the role of each instrument in the whole water treatment process

2. Principles Used in Instrumentation
   Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:
   a. Hydraulics (Basic Expertise)
   b. Pneumatics (Basic Expertise)
   c. Electricity (In-depth Expertise)

3. Critical and Analytical Thinking
   a. Critically reviews, analyzes, synthesizes, compares and interprets information
   b. Draws conclusions from relevant and/or missing information
   c. Uses a systematic approach to troubleshoot and pinpoint the causes of a problem
   d. Uses scientific rules and methods to solve problems
4. **Problem Solving and Decision Making**
   a. Gathers information from a variety of sources
   b. Thinks clearly and systematically under pressure
   c. Looks for practical ways to address problems
   d. Is able to see the larger picture, when viewing a problem

5. **Conscientiousness**
   a. Follows standard, prescribed approaches and protocols for completing regular tasks
   b. Attends to details when appropriate
   c. Demonstrates commitment to public service and public health
DISTRIBUTION SYSTEM OPERATIONS SUPERVISOR

DISTRIBUTION SYSTEM

Note: This is a generic competency model encompassing a broad segment of operations supervisors (distribution). The required competencies for the described position vary greatly from system to system and even within a single utility. The description covers employees who may perform their duties on an individual rather than a team basis. Therefore, water systems should carefully consider which of the competencies are needed in any specific job similar to this one in their own organization.

I. Technical Competencies

1. Water Distribution Systems
   Applying knowledge and expertise during planning, decision making, problem solving and oversight of performance of job responsibilities in the following areas:
   a. Operating, calibrating, maintaining, trouble-shooting, and diagnosing system-specific infrastructure, mainly pipes, hydrants and valves
   b. Inspecting the function of water mains, hydrants, valves and other appurtenances
   c. Collecting water samples, conducting basic tests using standard water testing procedures, and interpreting the test results
   d. Electrical and mechanical principles underlying system infrastructure operations (Basic Expertise)
   e. Hydraulic and pneumatic principles, fluid characteristics, pressure zones and use of control systems (In-depth Expertise)
   f. Cross connections and approved backflow methods and devices
   g. Main flushing procedures
   h. Using system-specific materials and equipment in the distribution system
   i. Following regulatory requirements that affect the operation and maintenance of the distribution system

2. Equipment Repair Procedures (Pipes, Hydrants, and Valves)
   Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:
   a. Recognizing malfunctioning hydrants and valves
   b. Disassembling and rebuilding parts
   c. Implementing manufacturers’ directions
   d. Troubleshooting malfunctions
   e. Implementation and coordination of appropriate response to repairs

3. Managing Human Resources Issues and Policies
   Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:
a. Personnel policies and procedures
b. Union contract terms, where appropriate
c. Conflict resolution methods
d. Scheduling and managing personnel

4. Mechanical Systems Used In Water Utilities (In-Depth Expertise)

Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:

a. Pumps and motors
b. Hydrants
c. Transport systems (hard pipe, tubing)
d. Storage facilities – tanks, reservoirs

5. Reading Plats, Maps, Plans and Drawings

Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:

a. Obtaining information to locate, and plan work activities
b. Geographical Information Systems (GIS) (Basic Expertise)

6. Computer Skills

Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:

a. Using site-specific software applications for maintenance and repair work, which includes creating work orders, scheduling, routing, and documentation
b. Using software to track schedules, budgets and inventory

7. Security and Safety Procedures

Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:

a. Personal safety equipment and procedures
b. Federal (OSHA), State and local laws and regulations pertaining to hazardous materials
c. Electrical and mechanical machinery and equipment protection
d. Treatment plant emergency procedures and protocols
e. Awareness of impact of actions on entire system

8. Water Quality Problems

Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:

a. Recognizing basic water quality problem indicators (such as taste, odor, turbidity, and color)
b. Recognizing chemical and pressure problems
c. Taking appropriate measures to address the problems

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II. Non-Technical Competencies

1. Communication
   a. Actively listens and seeks to understand others: employees, colleagues, managers and customers
   b. Asks for information and help from other knowledgeable site personnel when appropriate
   c. Asks questions and shares information with others to clarify distribution-related activities and problems
   d. Consistently keeps personnel on other shifts and in other units informed about ongoing water treatment processes and problems
   e. Effectively explains service interruptions and impacts of water problems to customers and other stakeholders
   f. Promptly notifies chain of command, when appropriate, about emerging problems

2. Conscientiousness
   a. Follows standard, prescribed approaches and protocols for completing regular tasks, such as opening and closing valves, conducting repairs, water sampling, testing, and maintenance of equipment
   b. Ensures that safe procedures are followed
   c. Completes required documentation of work activities, observations and tests results in an accurate and timely way
   d. Demonstrates commitment to public service and public health
   e. Ensures that employees are meeting prescribed approaches and protocols in their regular tasks
   f. Identifies and suggests areas for improvement
   g. Keeps self alert, vigilant, and focused on the job
   h. Responds to alarms and developing problems with appropriate urgency

3. Critical and Analytical Thinking
   a. Identifies inconsistent or missing information
   b. Critically analyzes, compares and interprets information
   c. Draws conclusions from relevant information
   d. Tests hypotheses to ensure that a problem is correctly diagnosed and the best solution is found
   e. Approaches a complex task by breaking it down into a series of steps
   f. Identifies alternative possible causes for a problem

4. Planning, Organizing, and Scheduling
   a. Prioritizes various competing tasks and performs them quickly and efficiently according to their urgency
   b. Plans work carefully in advance
   c. Anticipates obstacles and develops contingency plans to address them
d. Determines which equipment, materials, supplies, etc., are needed to complete the assignment and arranges to have them on hand or obtained in a timely manner
e. Estimates resources needed for project completion; allocates time and resources effectively
f. Reviews union contracts; approves payment
g. Schedules and routes crews
h. Responds to the schedules of others affected by arrangements; recognizes problems, generates effective alternatives, and takes corrective action
i. Takes necessary corrective action when project goes off-track

5. Creating a Positive Work Environment
c. Treats people with respect and insists that crew members do the same
d. Seeks out the perspectives of all parties involved in a situation
e. Asks for the views of all participants in meetings
f. Provides people with access to the information they need to do their jobs
g. Focuses the crew on learning from setbacks, rather than on identifying who is to blame
h. Asks crew members for their views, before sharing his/her own view
i. Acknowledges and thanks people for their efforts and contributions

6. Managing People’s Performance
a. Provides clear direction to crew members regarding roles and tasks
b. Shares and explains personnel policies and procedures to employees and contract workers
c. Holds people accountable for meeting performance expectations and adhering to policies and practices
d. Monitors crew members’ progress and performance
e. Provides specific, timely feedback on performance
f. Provides coaching as needed to help improve performance
g. Treats people fairly and logically, using a consistent set of performance standards
h. Addresses conflicts among crew members before they impact performance
i. Deals firmly and promptly with performance problems

III. Foundational Competencies (Mostly expected on entry into the position)

1. Technical Foundational Competencies
   a. Construction skills
   b. Mechanical skills – Equipment Repair (Basic Expertise)
   c. Ability to use hand tools and power tools

2. Non-Technical Foundational Competencies
   a. Listening: Attending carefully to others in order to understand what they are saying
b. Oral Communication: Speaking English well enough and clearly enough to be understood by supervisors, co-workers and customers

c. Ability to Learn: Incorporating classroom and on the job training into work performance

d. Physical Dexterity: The ability to use fine motor coordination to operate tools

e. Physical Strength: The ability to lift and carry heavy loads and to exert force with arms, legs, hands, and body

f. Reading: The ability to understand written material and to use written material to find information needed in one’s job

IV. Most Important Responsibilities

**Note:** Although job responsibilities are not part of a competency model, they are presented here because they helped to guide the selection of competencies.

1. Oversees crews that maintain valves, fire hydrants, pipes and services

2. Addresses and resolves employee issue

3. Oversees contractors working on the distribution system

4. Oversees quality control and continuous improvement

5. Reviews project designs for compliance with engineering principles, contract plans, scope, and specifications

V. Competencies for Superior Performance

**Note:** Sections I and II presented the technical and non-technical competencies needed for effective performance in the job. But which competencies lead to superior performance? This section (V) presents the competencies and their behavioral indicators that are thought to be most important to superior performance. Most of the competencies, but not all of their behavioral indicators, are ones that appeared earlier, in the section on effective performance. This section may also include one or two competencies that were not included earlier, because they facilitate superior performance but are not needed for effective performance. The selection of competencies for this section is based on a review of the interview data -- especially responses to questions about the most challenging situations encountered in the job and the skills and personal characteristics needed to dealing with these situations – and on experience working with and observing superior performers.

The numbering of the competencies and their behavioral indicators is not the same as that used in Sections I and II.

1. Conscientiousness
   a. Ensures that safety procedures and regulations are followed throughout the work site
b. Plans work carefully in advance  
c. Demonstrates commitment to public service and public health  
d. Identifies and suggests areas for improvement  

2. Creating a Positive Work Environment  
   a. Treats people with respect and insists that team members do the same  
   b. Seeks out the perspectives of all parties involved in a situation  
   c. Provides people with access to the information they need to do their jobs  
   d. Focuses the team on learning from setbacks, rather than on identifying who is to blame  
   e. Acknowledges and thanks people for their efforts and contributions  

3. Interpersonal Skills  
   a. Demonstrates concern for others by being sensitive to their needs and feelings  
   b. Develops trust-based relationships with others  
   c. Displays honesty and integrity  
   d. Keeps calm under pressure or in emergency situations  
   e. Pays attention to customer needs, showing empathy during service interruptions and crisis situations
Note: This is a generic competency model encompassing a broad segment of foremen and crew leaders. The required competencies for the described position vary greatly from system to system and even within a single utility. The description covers employees who may perform their duties on an individual rather than a team basis. Therefore, water systems should carefully consider which of the competencies are needed in any specific job similar to this one in their own organization.

I. Technical Competencies

1. Water Distribution Systems
   Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:
   a. Operating, calibrating, maintaining, trouble-shooting, and diagnosing system-specific infrastructure components and equipment
   b. Function of water mains, hydrants, valves and other appurtenances
   c. Collecting water samples, conducting basic tests using standard water testing procedures, and interpreting the test results
   d. Electrical and mechanical principles underlying system infrastructure operations (Basic Expertise)
   e. Hydraulic and pneumatic principles, fluid characteristics, pressure zones and use of control systems (Basic Expertise)
   f. Cross connections and approved backflow methods and devices
   g. Main flushing procedures
   h. Using system-specific materials and equipment in the distribution system
   i. Following emergency operating procedures applicable to the system
   j. Following regulatory requirements that affect the operation and maintenance of the distribution system

2. Reading Plats, Maps, Plans and Drawings
   Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:
   a. Obtaining information to locate and plan work activities
   b. Geographical Information Systems (GIS) (Basic Expertise)
   c. Measuring site and equipment specifications
   d. Making drawings of “as built” conditions after construction and repair

3. Security and Safety Procedures
   Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:
   a. Understanding of health and safety regulations, e.g., Safe Drinking Water Act
   b. Traffic control regulations
   c. Personal safety equipment and procedures
d. Federal (OSHA), State and local laws and regulations pertaining to hazardous materials and confined space  
e. Electrical and mechanical machinery and equipment protection  
f. Traffic control warnings and equipment  
g. Ensuring crew has protective equipment, safe tools and properly trained, including first aid  
h. Awareness of impact of actions on entire system

4. **Hydraulics**  
*Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in this area.*

5. **Equipment Repair Procedures (Pipe - Fitting, Valve and Hydrant Repair)**  
*Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:*  
   a. Recognizing malfunctioning equipment  
   b. Disassembling and rebuilding equipment  
   c. Fabricating parts and tools for repairs  
   d. Implementing manufacturer’s directions  
   e. Troubleshooting malfunctions  
   f. Using precision measuring tools  
   g. Shoring and trenching to support underground equipment repair

6. **System-Specific Expertise**  
*Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:*  
   a. Software systems used, including work management software, databases, spreadsheets and word processing  
   b. Organization of the facility  
   c. Treatment processes used at Jobholder’s Facility (Basic Expertise)  
   d. Equipment and machinery used in the facility’s distribution system  
   e. Safety requirements and procedures and the ability to assume responsibility for maintaining a safe working environment  
   f. Regulations and related requirements relevant to the operation of the water treatment process  
      1. Required sampling procedures and reporting requirements  
      2. Ensuring that all staff understands the importance of consistent compliance with all regulations

7. **Computer Skills**  
*Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:*  
   a. Using site-specific software applications for maintenance and repair work, which includes creating work orders, scheduling, routing, and documentation  
   b. Using software applications for communication and searching for information on the internet
II. Non-Technical Competencies

1. Conscientiousness
   a. Follows standard, prescribed approaches and protocols for completing regular tasks, such as opening and closing valves, shoring and trenching, conducting repairs, water sampling, testing, and maintenance of equipment
   b. Ensures that safe procedures are followed for the crew and for the public
   c. Takes careful notes at repair site and completes required documentation of work activities, observations and tests results in an accurate and timely way
   d. Makes accurate drawings of completed “as built” repairs for permanent asset records
   e. Plans work carefully in advance
   f. Demonstrates attention to detail
   g. Exhibits professional pride and diligence in his/her work
   h. Demonstrates honesty and integrity in all aspects of work
   i. Demonstrates commitment to public service and public health

2. Planning, Organizing, and Scheduling
   a. Prioritizes various competing tasks and performs them quickly and efficiently according to their urgency
   b. Creates annual schedule for valve exercising and hydrant flushing
   c. Plans and assigns tasks so that jobs are completed on time
   d. Completes work orders noting, for example, people, time and materials used
   e. Anticipates obstacles to project completion and develops contingency plans to address them
   f. Determines which equipment, materials, supplies, etc., are needed to complete the assignment and arranges to have them on hand or obtained in a timely manner

3. Critical and Analytical Thinking
   a. Identifies inconsistent or missing information
   b. Critically analyses, compares and interprets information
   c. Draws conclusions from relevant information
   d. Tests hypotheses to ensure that a problem is correctly diagnosed and the best solution is found
   e. Approaches a complex task by breaking it down into a series of steps
   f. Identifies alternative possible causes for a problem
4. Interpersonal Skills
   a. Pays attention to customer needs, showing empathy during service interruptions and crisis situations
   b. Shows understanding of others’ behavior by demonstrating appropriate responses
   c. Demonstrates flexibility and open mindedness when dealing with people of different backgrounds
   d. Develops trust-based relationships with others
   e. Involves others when making decisions
   f. Keeps calm under pressure or in emergency situations
   g. Learns and uses “public image” protocols for communicating with the public in a standard way about issues
   h. Shows respect for others, regardless of position or level of authority

5. Learning Orientation
   a. Asks for and accepts critical feedback about his/her performance
   b. Demonstrates interest in learning about new methodologies and approaches to work
   c. Introduces new approaches and technologies into work unit
   d. Keeps up to date with developments regarding equipment, regulations and technology
   e. Recognizes when help is needed and seeks help from others
   f. Uses material taught in the classroom and on-the-job training in work situations
   g. Accepts feedback or criticism without becoming defensive
   h. Recognizes and addresses own development needs

6. Customer Focus
   a. Views situations from the perspective of customers and the public
   b. Notifies customers and officials of temporary water main shut-off
   c. Ensures that customer and the public’s questions and issues are promptly addressed
   d. Places a high priority on meeting customer needs

7. Creating a Positive Work Environment
   a. Treats people with respect and insists that team members do the same
   b. Demonstrates and encourages teamwork
   c. Involves team members in decisions
   d. Provides others with access to the information they need to do their jobs
   e. Assigns and delegates based on strengths
   f. Focuses the team on learning from setbacks, rather than on identifying who is to blame
   g. Acknowledges and thanks people for their efforts and contributions
   h. Expresses confidence in people’s ability to master new roles and challenging situations
   i. Identifies and promptly tackles morale problems
j. Leads by example

III. Foundational Competencies (Mostly expected on entry into the position)

1. Technical Foundational Competencies
   a. Mechanical Skills (Basic Expertise)
   b. Ability to use hand tools and power tools
   c. Computer Skills
   d. Construction Skills

2. Non-Technical Foundational Competencies
   a. Listening: Attending carefully to others in order to understand what they are saying
   b. Oral Communication: Speaking English well enough and clearly enough to be understood by supervisors, co-workers and customers
   c. Ability to Learn: Incorporating classroom and on the job training into work performance
   d. Professionalism: Maintaining a professional presence and adhering to ethical standards
   e. Physical Dexterity: The ability to use fine motor coordination to operate tools
   f. Physical Strength: The ability to lift and carry heavy loads and to exert force with arms, legs, hands, and body

IV. Most Important Responsibilities

Note: Although job responsibilities are not part of a competency model, they are presented here because they helped to guide the selection of competencies.

1. Manages and oversees the crews responsible for repairs in the distribution system
2. Ensures the safety of the crew and public
3. Oversees the completion of preventative maintenance tasks
4. Creates permanent asset records of construction

V. Competencies for Superior Performance

Note: Sections I and II presented the technical and non-technical competencies needed for effective performance in the job. But which competencies lead to superior performance? This section (V) presents the competencies and their behavioral indicators that are thought to be the most important to superior performance. Most of the competencies, but not all of their behavioral indicators, are ones that appeared earlier, in the section on effective performance. This section may also include one or two competencies that were not included earlier, because they facilitate superior performance but are not needed for effective performance. The selection of competencies for this section is based on a review of the interview data -- especially
responses to questions about the most challenging situations encountered in the job and the skills and personal characteristics needed to dealing with these situations – and on experience working with and observing superior performers.

The numbering of the competencies and their behavioral indicators is not the same as that used in Sections I and II.

1. **Conscientiousness**
   a. Follows standard, prescribed approaches and protocols for completing regular tasks, such as opening and closing valves, shoring and trenching, conducting repairs, water sampling, testing, and maintenance of equipment
   b. Ensures that safe procedures are followed for the crew and for the public
   c. Takes careful notes at repair site and completes required documentation of work activities, observations and tests results in an accurate and timely way
   d. Makes accurate drawings of completed “as built” repairs for permanent asset records
   e. Exhibits professional pride and diligence in his/her work
   f. Demonstrates commitment to public service and public health

2. **Creating a Positive Work Environment**
   a. Treats people with respect and insists that team members do the same
   b. Assigns and delegates based on strengths
   c. Acknowledges and thanks people for their efforts and contributions
   d. Expresses confidence in people’s ability to master new roles and challenging situations
   e. Leads by example

3. **Driving for Results**
   a. Demonstrates a strong sense of urgency about solving problems and getting the job done
   b. Stays focused on goals, despite obstacles and set-backs
   c. Holds others accountable for agreed results or commitments
   d. Sets clear goals and objectives for meetings and projects
   e. Makes personal sacrifices when necessary to get the job done
   f. Demonstrates the ability to deal with multiple, concurrent problems or tasks

4. **System-Specific Expertise (In-depth)**
   Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:
   a. Software systems used, including work management software, databases, spreadsheets and word processing
   b. Organization of the facility and distribution system
   c. Treatment processes used at Jobholder’s Facility
   d. Equipment and machinery used in the facility’s distribution system
   e. Safety requirements and procedures and the ability to assume responsibility for maintaining a safe working environment
f. Regulations and related requirements relevant to the operation of the water treatment process
   1. Required sampling procedures and reporting requirements
   2. Ensuring that all staff understands the importance of consistent compliance with all regulations
Note: This is a generic competency model encompassing a broad segment of water quality specialists. The required competencies for the described position vary greatly from system to system and even within a single utility. The description covers employees who may perform their duties on an individual rather than a team basis. Therefore, water systems should carefully consider which of the competencies are needed in any specific job similar to this one in their own organization.

I. Technical Competencies

1. Water and Health Regulations
   Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:
   a. Site-specific compliance with Safe Drinking Water Act, Clean Water Act and State water quality regulations
   b. Addressing water-borne bacteria and chemical toxicity issues on a system-wide level
   c. Procedures and Regulations and related requirements relevant to the operation of the water treatment process
      1. Required sampling procedures and reporting requirements
      2. Ensuring that all staff understands the importance of consistent compliance with all regulations
      3. Personal safety equipment and procedures

2. Water Treatment Principles and Practices
   Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:
   a. Function of water treatment systems and plant unit processes
      1. What to monitor and how to control the process
      2. Process equipment and chemicals used in treatment
      3. Effects of changes in water treatment on water quality
      4. Effects of water quality changes on water treatment processes
   b. Regulations relevant to the operation and performance of the water treatment process and the duties of the operator’s position
   c. Understanding information shown on SCADA screens

3. Process Control System for Water Treatment at Jobholder’s Facility
   Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:
   a. Understanding what the operator monitors, the goals of the process, and how the operator controls the process
   b. Process equipment used in the treatment and distribution systems (Basic Expertise)
   c. Following regulatory parameters used for process control
d. Understanding alarm trigger points in use by operating personnel and providing support to operations personnel

4. Water Quality Problems
   Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:
   a. Recognizing water quality problem indicators (such as taste, odor, turbidity, and color), both basic and complex
   b. Taking appropriate measures to address the problems

5. Quality Control Procedures
   Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:
   a. Quality control procedures used in water testing, analysis and treatment, general and system-specific
   b. Obtaining precise, accurate measures

6. Computer Skills
   Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:
   a. Using site-specific software applications for reporting water testing and analysis results
   b. Instrument specific applications for water treatment analysis

7. Security and Safety Procedures
   Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:
   a. Ability to assume responsibility for maintaining a safe working environment
   b. Federal (OSHA), State and local laws and regulations pertaining to hazardous materials
   c. Laboratory emergency procedures and protocols
   d. Awareness of impact of actions on entire system

II. Non-Technical Competencies

1. Communication
   a. Actively listens and seeks to understand others: employees, colleagues, managers and customers
   b. Asks questions and shares information with management to clarify water treatment activities and problems
   c. Consistently keeps management and facility staff informed and advised about water quality/treatment regulations and their impact on the facility and its customers
   d. Responds to requests from customers and facility management for water quality data
e. Responds, personally and through staff, to concerns and complaints by customers and other stakeholders regarding water quality

2. **Conscientiousness**
   a. Demonstrates commitment to public service and public health
   b. Completes required documentation of work activities and work products in an accurate and timely way
   c. Reviews logs for trends on a regular and timely basis
   d. Looks beyond others’ stated needs in order to add value where appropriate
   e. Collects additional data for verification, when tests or observations indicate an emerging problem
   f. Ensures that lab technicians are certified and are meeting prescribed approaches and protocols in their regular tasks
   g. Follows standard, prescribed approaches and protocols / SOPs for completing regular tasks and for addressing emergency situations
   h. Identifies and suggests areas for improvement
   i. Investigates situations promptly when logs indicate an emerging problem
   j. Keeps legible work records
   k. Plans work carefully in advance

3. **Critical and Analytical Thinking**
   a. Uses a step-by-step, logical process to rule out possible causes of a problem and identify its underlying cause
   b. Critically analyses, compares and interprets information
   c. Draws conclusions from relevant information
   d. Identifies alternative causes for a problem including most likely cause(s)
   e. Identifies many alternative possible causes for a problem
   f. Identifies missing or needed information and the means to obtain it
   g. Is able to deal with multiple variables when analyzing a problem
   h. Notices discrepancies and inconsistencies in available information
   i. Sets up experimental comparisons in which all conditions but one are kept the same, in order to determine whether the single varying condition causes a different result
   j. Tests hypotheses to ensure that a problem is correctly diagnosed and that the best solution is found
   k. Uses scientific rules and methods to solve problems
   l. Identifies the criteria for a good decision
   m. Assesses and integrates multiple data points in a situation, to determine an appropriate course of action

4. **Customer Focus**
   a. Places a high priority on meeting customer needs
   b. Receives and listens to (personally or through staff) customer complaints
   c. Views situations from the perspective of customers
   d. Discusses water quality issues thoroughly with customers and/or customer support staff
e. Conducts water sample analysis for customers with specific complaints
f. Ensures that customer requests are promptly addressed and resolved
g. Creates annual report to customers (CCR) on water quality compliance

5. **Forward Thinking**
a. Notices and analyzes trends in water regulations and water quality research and develops plans to prepare for opportunities or problems
b. Anticipates the consequences of water quality-related situations and plans accordingly
c. Anticipates how customers, facility managers and staff will react to water quality situations and information and plans accordingly

6. **Information Sharing**
a. Defines data needs and conducts special studies on water quality within the facility
b. Creates and distributes monthly compliance report for the State (EPA)
c. Creates annual report for customers (CCR) on water quality compliance
d. Promptly notifies chain of command about trends and emerging water quality problems
e. Shares work-related information openly with employees and colleagues, yet maintains confidentiality where appropriate

7. **Interpersonal Skills**
a. Demonstrates concern for others by being sensitive to their needs and feelings
b. Shows understanding of others’ behavior by demonstrating appropriate responses
c. Periodically summarizes what he/she has heard, to demonstrate listening and to check that he/she has correctly understood what the other person has said
d. Seeks and obtains buy-in from multiple stakeholders
e. Demonstrates flexibility and open mindedness when dealing with a wide range of people
f. Stays calm under pressure or in emergency situations
g. Collaborates with other units within the utility
h. Coaches and motivates colleagues to address water quality trends and issues

8. **Planning, Organizing, and Scheduling**
a. Prepare reports, maintains schedules and paperwork
b. Prioritizes various competing tasks and performs them quickly and efficiently according to their urgency
c. Anticipates obstacles to project completion and develops contingency plans to address them
d. Plans and schedules tasks so that work is completed on time
e. Keeps track of details to ensure work is performed accurately and completely
f. Responds to the schedules of others affected by arrangements; recognizes problems, generates effective alternatives, and takes corrective action
g. Is able to multi-task
III. Foundational Competencies (Mostly expected on entry into the position)

1. Technical Foundational Competencies
   a. Analytical Laboratory Methods: Comprehensive knowledge and practice in scientific methods for sampling, testing and documentation; up-to-date laboratory compliance practices
   b. Biology
   c. Chemistry
   d. Environmental Regulations: Comprehensive knowledge of environmental law, including the Safe Water Drinking Act and its implications
   e. Computer Skills: Comprehensive knowledge of computer applications, including databases, spreadsheets, and word processing.
   f. Lab Instruments: comprehensive knowledge of laboratory instruments and their use in applied research settings
   g. Mathematics
   h. Pneumatics (Basic Expertise)
   i. Reading and Interpreting Technical Manuals and Drawings

2. Non-Technical Foundational Competencies
   a. Oral Communication: Ability to communicate complex ideas in speaking at an appropriate level to be understood by supervisors, co-workers and customers
   b. Listening: Attending carefully to others in order to understand what they are saying
   c. Reading: Ability to understand written material and to use written material to find information needed in one’s job
   d. Written Communication: Ability to express oneself clearly in writing, including technical documentation
   e. Ability to Learn: Incorporating classroom and on the job training into work performance
   f. Professionalism: Maintaining a professional presence and adhering to ethical standards

IV. Most Important Responsibilities

Note: Although job responsibilities are not part of a competency model, they are presented here because they helped to guide the selection of competencies.

1. Ensures that the facility maintains compliance with all requirements of the Safe Drinking Water Act
2. Ensures that laboratory maintains certification with the State
3. Responds to and resolves, where possible, water quality complaints
4. Provides support on water quality issues to production and management staff
V. Competencies for Superior Performance

Note: Sections I and II presented the technical and non-technical competencies needed for effective performance in the job. But which competencies lead to superior performance? This section (V) presents the competencies and their behavioral indicators that are thought to be the most important to superior performance. Most of the competencies, but not all of their behavioral indicators, are ones that appeared earlier, in the section on effective performance. This section may also include one or two competencies that were not included earlier, because they facilitate superior performance but are not needed for effective performance. The selection of competencies for this section is based on a review of the interview data -- especially responses to questions about the most challenging situations encountered in the job and the skills and personal characteristics needed to dealing with these situations -- and on experience working with and observing superior performers.

The numbering of the competencies and their behavioral indicators is not the same as that used in Sections I and II.

1. Conscientiousness
   a. Demonstrates commitment to public service and public health
   b. Collects additional data for verification, when tests or observations indicate an emerging problem
   c. Ensures that lab technicians are certified and are meeting prescribed approaches and protocols in their regular tasks
   d. Ensures that entire site is meeting water quality standards and regulations
   e. Follows standard, prescribed approaches and protocols / SOPs for completing regular tasks and for addressing emergency situations
   f. Identifies and suggests areas for improvement
   g. Investigates situations promptly when logs indicate an emerging problem
   h. Keeps legible work records
   i. Responds to alarms and developing problems with appropriate urgency

2. Customer Focus
   a. Places a high priority on meeting customer needs
   b. Receives and listens to (personally or through staff) customer complaints
   c. Views situations from the perspective of customers
   d. Discusses water quality issues thoroughly with customers and/or customer support staff
   e. Creates annual report to customers (CCR) on water quality compliance

3. Deep Understanding of Site – Specific Water Treatment / Distribution System Processes and Procedures
   Applying deep knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:
   a. How water treatment works, in general and at this site
   b. Function of water treatment systems and plant unit processes, in general and at this site
1. What to monitor and how to control the process  
2. Process equipment and chemicals used in treatment  
3. Effects of changes in water treatment on water quality  
4. Effects of water quality changes on water treatment processes  
5. Principles of filter operation  
   c. Deep understanding of the distribution system functioning

4. Water and Health Regulations

   Applying deep knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:
   a. Site-specific compliance with Safe Drinking Water Act, Clean Water Act and State water quality regulations  
   b. Addressing water-borne bacteria and chemical toxicity issues on a system-wide level  
   c. Procedures and Regulations and related requirements relevant to the operation of the water treatment process  
      1. Required sampling procedures and reporting requirements  
      2. Ensuring that all staff understands the importance of consistent compliance with all regulations  
      3. Personal safety equipment and procedures
Note: This is a generic competency model encompassing a broad segment of customer service representatives. The required competencies for the described position vary greatly from system to system and even within a single utility. The description covers employees who may perform their duties on an individual rather than a team basis. Therefore, water systems should carefully consider which of the competencies are needed in any specific job similar to this one in their own organization.

I. Technical Competencies

1. Computer Skills (Basic Expertise)
   Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:
   a. Using site-specific system for logging and managing customer calls and communications
   b. Using site-specific email system
   c. Using site-specific computer system for managing billing

2. Billing Systems and Procedures
   Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:
   a. Explaining customer bills to customers
   b. Explaining company policies related to turning on and off water
   c. Comparing a recent bill to the customer’s previous usage to assess whether there may be a problem with the bill or with the system supplying water to the customer’s home or business

3. Water Treatment System / Distribution System (Basic Expertise)
   Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:
   a. General understanding of how water distribution works
   b. General understanding of how water is treated at the plant
   c. Explaining to customers how the water treatment and distribution system works

II. Non-Technical Competencies

1. Communication
   a. Actively listens and seeks to understand others: customers, colleagues, managers
   b. Clearly explains to customers how their bill is calculated
   c. Clearly explains company policies regarding billing, initiation and termination of water service, and investigation of possible problems related to water quality and usage
d. Conveys to customers, both through content and tone, that he/she understands their concerns

e. Effectively explains service interruptions and impacts of water problems to customers and other stakeholders

f. Promptly notifies chain of command, when appropriate, about emerging problems

2. Critical and Analytical Thinking
   a. Critically analyzes, compares and interprets information
   b. Draws conclusions from relevant information
   c. Identifies alternative causes for a problem including most likely cause(s)
   d. Identifies inconsistent or missing information
   e. Identifies many alternative possible causes for a problem
   f. Notices discrepancies and inconsistencies in available information

3. Customer Focus
   a. Views situations from the perspective of customers
   b. Ensures that customer requests are promptly addressed
   c. Places a high priority on meeting customer needs

4. Interpersonal Skills
   a. Demonstrates concern for others by being sensitive to their needs and feelings
   b. Demonstrates flexibility and open mindedness when dealing with people of different backgrounds
   c. Develops trust-based relationships with others
   d. Periodically summarizes what he/she has heard, to demonstrate listening and to check that he/she has correctly understood what the other person has said
   e. Shows understanding of others’ behavior by demonstrating appropriate responses

5. Self Control
   a. Avoids the temptation to say or do things that are inappropriate
   b. Controls the impulse to respond with anger when attacked or criticized; substitutes more appropriate responses
   c. Stays calm when confronted, under attack, or in other high-stress situations
   d. Accepts criticism or negative feedback without loss of self-esteem

III. Foundational Competencies (Mostly expected on entry into the position)

1. Technical Foundational Competencies
   a. Computer Skills (Basic Expertise)
   b. Mathematics (Basic Expertise)

2. Non-Technical Foundational Competencies
   a. Dependability and Reliability: Displaying responsible behavior at work
b. Following Directions: Receiving, understanding, and carrying out assignments or following Standard Operating Procedures with minimal supervision  
c. Listening: Attending carefully to others in order to understand what they are saying  
d. Oral Communication: Ability to communicate complex ideas in speaking at an appropriate level to be understood by supervisors, co-workers and customers.  
e. Professionalism: Maintaining a professional presence and adhering to ethical standards  
f. Reading: Ability to understand written material and to use written material to find information needed in one’s job  
g. Written Communication: Ability to express oneself clearly in writing, including technical documentation

IV. Most Important Responsibilities

Note: Although job responsibilities are not part of a competency model, they are presented here because they helped to guide the selection of competencies.

1. Responds to and resolves where possible customer complaints regarding water usage (high/low), and helps customers interpret their water bills  
2. Explains policies and procedures related to billing and collections  
3. Refers customers with concerns about water quality, conservation, etc., to other departments  
4. Starts new service or ends service when customers are moving

V. Competencies for Superior Performance

Note: Sections I and II presented the technical and non-technical competencies needed for effective performance in the job. But which competencies lead to superior performance? This section (V) presents the competencies and their behavioral indicators that are thought to be the most important to superior performance. Most of the competencies, but not all of their behavioral indicators, are ones that were appeared earlier, in the section on effective performance. This section may also include one or two competencies that were not included earlier, because they facilitate superior performance but are not needed for effective performance. The selection of competencies for this section is based on a review of the interview data -- especially responses to questions about the most challenging situations encountered in the job and the skills and personal characteristics needed to dealing with these situations – and on experience working with and observing superior performers.

The numbering of the competencies and their behavioral indicators is not the same as that used in Sections I and II.
1. **Interpersonal Skills**
   a. Demonstrates concern for others by being sensitive to their needs and feelings
   b. Demonstrates flexibility and open mindedness when dealing with people of different backgrounds
   c. Periodically summarizes what he/she has heard, to demonstrate listening and to check that he/she has correctly understood what the other person has said
   d. Shows understanding of others’ behavior by demonstrating appropriate responses

2. **Customer Focus**
   a. Views situations from the perspective of customers
   b. Ensures that customer requests are promptly addressed
   c. Places a high priority on meeting customer needs

3. **Conscientiousness**
   a. Adopts a daily routine to ensure timely completion of regular tasks
   b. Attends to details when appropriate
   c. Checks own work to ensure accuracy
   d. Completes required documentation of work activities, observations and test results in an accurate and timely way
   e. Demonstrates commitment to public service and public health
   f. Demonstrates reliability and dependability
   g. Keeps self alert, vigilant, and focused on the job
   h. Sets appropriate priorities for tasks

4. **Learning Orientation**
   a. Actively seeks and completes training to enhance work-related skills and knowledge
   b. Applies material taught in the classroom in on-the-job training
   c. Asks for and accepts critical feedback about his/her performance
   d. Demonstrates interest in learning about new technologies
   e. Recognizes when help is needed and seeks help from others
   f. Recognizes and addresses own development needs
LABORATORY TECHNICIAN

Note: This is a generic competency model encompassing a broad segment of laboratory technicians. The required competencies for the described position vary greatly from system to system and even within a single utility. The description covers employees who may perform their duties on an individual rather than a team basis. Therefore, water systems should carefully consider which of the competencies are needed in any specific job similar to this one in their own organization.

I. Technical Competencies

1. Analytical Laboratory Methods
   Applying knowledge and expertise during the performance of job responsibilities in the following areas:
   a. Methods for sampling, and preserving water samples
   b. Performing analyses on water samples for parameters such as pH, temperature, fluoride, hardness, disinfectant residuals and organic contaminants
   c. Documentation and record keeping of sample procedures and results
   d. Following Standard Operating Procedures for methods
   e. Adhering to safe laboratory procedures

2. Laboratory Equipment and Instrumentation
   Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:
   a. Proper operation of instrumentation for testing water samples
   b. Maintenance and documentation of instrumentation

3. Computer Skills
   Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:
   a. Company-specific system for recording and tracking water testing
   b. Instrument specific software for operation
   c. Software for communication, word processing and databases

4. Quality Control Procedures
   Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:
   a. Quality control procedures used in water testing, analysis and treatment, general and system-specific
   b. Obtaining precise, accurate measurements
II. Non-Technical Competencies

1. **Conscientiousness**
   a. Adopts a daily routine to ensure timely completion of regular tasks
   b. Attends to details when appropriate
   c. Checks own work to ensure accuracy
   d. Collects additional data for verification, when tests or observations indicate an emerging problem
   e. Completes required documentation of work activities, observations and test results in an accurate and timely way
   f. Demonstrates commitment to public service and public health
   g. Demonstrates reliability and dependability
   h. Demonstrates concern for precise measurement
   i. Follows standard, prescribed approaches and protocols / SOPs for completing regular tasks and for addressing emergency situations
   j. Keeps legible work records
   k. Keeps self alert, vigilant, and focused on the job
   l. Plans work carefully in advance
   m. Ensures the accuracy and integrity of the record of own work

2. **Planning, Organizing, and Scheduling**
   a. Allocates time and resources effectively
   b. Determines which equipment, materials, supplies, etc., are needed to complete the assignment and arranges to have them on hand or obtained in a timely manner
   c. Estimates resources needed for project completion; allocates time and resources effectively
   d. Keeps track of details to ensure work is performed accurately and completely
   e. Plans and schedules tasks so that work is completed on time

3. **Critical and Analytical Thinking**
   a. Critically analyzes, compares and interprets information
   b. Draws conclusions from relevant information
   c. Identifies alternative causes for a problem including most likely cause(s)
   d. Identifies inconsistent or missing information
   e. Identifies many alternative possible causes for a problem
   f. Identifies missing or needed information and the means to obtain it
   g. Notices discrepancies and inconsistencies in available information
   h. Uses a step-by-step, logical process to rule out possible causes of a problem and identify its underlying cause
   i. Uses a systematic approach to troubleshoot and pinpoint the causes of a problem
   j. Uses scientific rules and methods to solve problems
Appendix A: Competency Models for Twelve Water Industry Positions | 127

III. Foundational Competencies (Mostly expected on entry into the position)

1. Technical Foundational Competencies
   a. Computer Skills (Basic)
   b. Chemistry
   c. Biology
   d. Microbiology
   e. Laboratory analytical skills

2. Non-Technical Foundational Competencies
   a. Dependability and Reliability: Displaying responsible behavior at work
   b. Following Directions: Receiving, understanding, and carrying out assignments or following Standard Operating Procedures with minimal supervision
   c. Listening: Attending carefully to others in order to understand what they are saying
   d. Oral Communication: Speaking English well enough and clearly enough to be understood by supervisors, co-workers, and customers
   e. Written Communication: The ability to express oneself clearly in writing
   f. Reading: The ability to understand written material and to use written material to find information needed in one’s job
   g. Professionalism: Maintaining a professional presence and adhering to ethical standards

IV. Most Important Responsibilities

*Note: Although job responsibilities are not part of a competency model, they are presented here because they helped to guide the selection of competencies.*

1. Prepares water, chemical and sludge samples for analysis of microbiological and chemical constituents
2. Analyzes samples using appropriate instruments and equipment and interpret results
3. Performs testing and procedures required to maintain quality assurance/quality control
4. Maintains all laboratory records as stipulated in the lab’s Operating Procedure

V. Competencies for Superior Performance

*Note: Sections I and II presented the technical and non-technical competencies needed for effective performance in the job. But which competencies lead to superior performance? This section (V) presents the competencies and their behavioral indicators that are thought to be the most important to superior performance. Most of the competencies, but not all of their behavioral indicators, are ones that were appeared earlier, in the section on effective performance. This section may also include one or two competencies that were not included*
earlier, because they facilitate superior performance but are not needed for effective performance. The selection of competencies for this section is based on a review of the interview data -- especially responses to questions about the most challenging situations encountered in the job and the skills and personal characteristics needed to dealing with these situations – and on experience working with and observing superior performers.

The numbering of the competencies and their behavioral indicators is not the same as that used in Sections I and II.

1. **Conscientiousness**  
   a. Checks own work to ensure accuracy  
   b. Collects additional data for verification, when tests or observations indicate an emerging problem  
   c. Completes required documentation of work activities, observations and test results in an accurate and timely way  
   d. Demonstrates commitment to public service and public health  
   e. Ensures the accuracy and integrity of the record of own work

2. **Planning, Organizing, and Scheduling**  
   a. Determines which equipment, materials, supplies, etc., are needed to complete the assignment and arranges to have them on hand or obtained in a timely manner  
   b. Keeps track of details to ensure work is performed accurately and completely  
   c. Plans and schedules tasks so that work is completed on time
PROJECT ENGINEER

**Note:** This is a generic competency model encompassing a broad segment of project engineers focusing on water process and distribution functions. The required competencies for the described position vary greatly from system to system and even within a single utility. The description covers employees who may perform their duties on an individual rather than a team basis. Therefore, water systems should carefully consider which of the competencies are needed in any specific job similar to this one in their own organization.

I. Technical Competencies

1. **Water Treatment Principles and Practices (In-Depth Expertise)**
   
   Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:
   
   a. Function of water treatment systems and plant unit processes
      
      1. What to monitor and how to control the process
      2. Process equipment and chemicals used in treatment
      3. Effects that changes in water treatment have on water quality
      4. Effects of water quality changes on water treatment processes
      5. Principles of filter operation
   
   b. Interpreting information shown on whole systems technology (e.g., SCADA) screens
   
   c. Interpreting water sampling test results
   
   d. Hydraulics (Basic Expertise)
   
   e. Water treatment plant unit processes (filters, mixing chambers, etc.)
   
   f. Regulations affecting water treatment and distribution

2. **Water Distribution Systems**
   
   Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:
   
   a. Operating, maintaining, trouble-shooting and diagnosing system-specific infrastructure components and equipment
   
   b. Function of water mains, hydrants, valves and other appurtenances
   
   c. Interpreting data from water sample results
   
   d. Electrical and mechanical principles underlying system infrastructure operations
   
   e. Hydraulic and pneumatic principles, fluid characteristics, pressure zones and use of control systems
   
   f. Cross connections and approved backflow methods and devices
   
   g. Main flushing procedures
   
   h. System-specific storage tank turnover operations
   
   i. Using system-specific materials and equipment in the distribution system
   
   j. Following emergency operating procedures applicable to the system
   
   k. Following regulatory requirements that affect the operation and maintenance of the distribution system
3. **System-Specific Expertise (In-depth Expertise)**  
   *Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:*
   a. Intranet/server system, devices, and security/Intranet/server system, devices, and security
   b. Software systems used, including process control languages, databases, spreadsheets and word processing
   c. Instrumentation and communications
   d. Safety requirements and procedures
   e. Organization of the facility
   f. Safety requirements and procedures
   g. Regulations and related requirements relevant to the operation of the water treatment process
   h. Required sampling procedures and reporting requirements

4. **Engineering Skills**  
   *Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:*
   a. Engineering problem solving methodology
   b. Principles of engineering
   c. Knowledge of construction techniques used in system specific projects

5. **Computer Skills**  
   *Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:*
   a. Software programs and systems for managing plant processes and operations
   b. Use of Excel, Word, and project management software
   c. GIS, Computer design software expertise

6. **Project Planning and Management**  
   *Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:*
   a. Developing and managing project budgets
   b. Estimating project costs
   c. Tracking expenses on in-house and consultant projects
   d. Approval of change orders

II. **Non-Technical Competencies**

1. **Communication**  
   a. Actively listens and seeks to understand others: employees, colleagues, managers and customers
   b. Clearly explains what he/she wants and needs from others
   c. Asks for information and help from other knowledgeable plant personnel when appropriate
d. Promptly notifies chain of command, when appropriate, about emerging problems

2. **Conscientiousness**
   a. Attends to details when appropriate
   b. Checks own work to ensure accuracy
   c. Collects additional data for verification, when tests or observations indicate an emerging problem
   d. Completes required documentation of work activities, observations and test results in an accurate and timely way
   e. Demonstrates commitment to public service and public health
   f. Demonstrates reliability and dependability
   g. Ensures that contractors are meeting prescribed approaches and protocols in their project tasks
   h. Ensures that safe procedures are followed
   i. Follows standard, prescribed approaches and protocols / SOPs for completing regular tasks and for addressing emergency situations
   j. Keeps self alert, vigilant, and focused on the job
   k. Plans work carefully in advance
   l. Sets appropriate priorities for tasks

3. **Planning, Organizing, and Scheduling**
   a. Allocates time and resources effectively
   b. Anticipates obstacles to project completion and develops contingency plans to address them
   c. Determines which equipment, materials, supplies, etc., are needed to complete the assignment and arranges to have them on hand or obtained in a timely manner
   d. Estimates resources needed for project completion; allocates time and resources effectively
   e. Is able to multi-task
   f. Keeps track of details to ensure work is performed accurately and completely
   g. Plans and schedules tasks so that work is completed on time
   h. Prioritizes various competing tasks and performs them quickly and efficiently according to their urgency
   i. Takes necessary corrective action when projects go off-track

4. **Interpersonal Skills**
   a. Demonstrates concern for others by being sensitive to their needs and feelings
   b. Demonstrates flexibility and open mindedness when dealing with people of different backgrounds
   c. Develops trust-based relationships with others
   d. Involves others when making decisions
   e. Periodically summarizes what he/she has heard, to demonstrate listening and to check that he/she has correctly understood what the other person has said
   f. Remains calm under pressure, maintaining control over emotions

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g. Shows respect for others, regardless of position or level of authority
h. Shows understanding of others’ behavior by demonstrating appropriate responses

5. Teamwork
   a. Effectively communicates with all members of the team to achieve goals
   b. Develops constructive and cooperative working relationships with others
   c. Shows sensitivity to the thoughts and opinions of others
   d. Responds appropriately to positive and negative feedback
   e. Encourages others to express their ideas and opinions
   f. Keeps all parties informed of progress and all relevant changes to project timelines
   g. Demonstrates loyalty to the team
   h. Listens and responds constructively to other team members’ ideas
   i. Is open with other team members about his/her concerns
   j. Expresses disagreement constructively (e.g., by emphasizing points of agreement, suggesting alternatives that may be acceptable to the group)
   k. Reinforces team members for their contributions
   l. Gives honest and constructive feedback to other team members
   m. Provides assistance to others when they need it
   n. Works for solutions that all team members can support

6. Self Confidence
   a. Is confident of own ability to accomplish goals
   b. Presents self crisply and impressively
   c. Is willing to speak up when he she disagrees with a decision or strategy
   d. Approaches challenging tasks with a “can-do” attitude
   e. Is willing and able to say no, when necessary
   f. Is willing to step out of his/her comfort zone to accept a role or responsibility that is unfamiliar
   g. Bounces back quickly from set-backs; does not dwell on failures or criticism

III. Foundational Competencies (Mostly expected on entry into the position)

1. Technical Foundational Competencies
   a. Engineering Skill
   b. Computer Skills
   c. Hydraulic Systems
   d. Mathematics

2. Non-Technical Foundational Competencies
   a. Ability to Learn: Incorporating classroom and on-the-job training into work performance
   b. Listening: Attending carefully to others in order to understand what they are saying
c. Oral Communication: Speaking English well enough and clearly enough to be understood by supervisors, co-workers, and customers
d. Written Communication: The ability to express oneself clearly in writing.
e. Reading: The ability to understand written material and to use written material to find information needed in one’s job
f. Professionalism: Maintaining a professional presence and adhering to ethical standards

IV. Most Important Responsibilities

*Note: Although job responsibilities are not part of a competency model, they are presented here because they helped to guide the selection of competencies.*

1. Makes recommendations for water system repairs and upgrades and prepares request for proposals for these projects

2. Defines the project philosophy, activities, milestones, and staff requirements of projects

3. Provides project management for projects related to the provision, treatment, transmission, and protection of public drinking water supplies performed by contractors

4. Reviews project designs for compliance with engineering principles, contract plans, scope and specifications

V. Competencies for Superior Performance

*Note: Sections I and II presented the technical and non-technical competencies needed for effective performance in the job. But which competencies lead to superior performance? This section (V) presents the competencies and their behavioral indicators that are thought to be most important to superior performance. Most of the competencies, but not all of their behavioral indicators, are ones that appeared earlier, in the section on effective performance. This section may also include one or two competencies that were not included earlier, because they facilitate superior performance but are not needed for effective performance. The selection of competencies for this section is based on a review of the interview data -- especially responses to questions about the most challenging situations encountered in the job and the skills and personal characteristics needed to dealing with these situations – and on experience working with and observing superior performers.*

*The numbering of the competencies and their behavioral indicators is not the same as that used in Sections I and II.*

1. **Conscientiousness**
   a. Collects additional data for verification, when tests or observations indicate an emerging problem
b. Attends to detail when appropriate
c. Ensures that contractors are meeting prescribed approaches and protocols in their project tasks

2. Interpersonal Skills
   a. Develops trust-based relationships with others
   b. Involves others when making decisions
   c. Periodically summarizes what he/she has heard, to demonstrate listening and to check that he/she has correctly understood what the other person has said
d. Remains calm under pressure, maintaining control over emotions
e. Shows respect for others, regardless of position or level of authority
f. Shows understanding of others’ behavior by demonstrating appropriate responses

3. Engineering Skills
   Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:
   a. Engineering problem solving methodology
   b. Principles of engineering
   c. Knowledge of construction techniques used in system specific projects

4. Information Gathering
   a. Identifies the information needed to clarify a problem
   b. Seeks information from multiple sources (e.g., documents, on-line resources, people) to clarify a situation or problem
c. Probes skillfully to get at the facts, when others are reluctant to provide full, detailed information
d. Asks questions to clarify a problem
e. Questions others to assess whether they have thought through a plan of action

5. Self Confidence
   a. Is confident of own ability to accomplish goals
   b. Presents self crisply and impressively
c. Is willing to speak up when he/she disagrees with a decision or strategy
d. Approaches challenging tasks with a “can-do” attitude
e. Is willing and able to say no, when necessary
f. Is willing to step out of his/her comfort zone to accept a role or responsibility that is unfamiliar
APPENDIX B:
COMPETENCY GLOSSARY

This Competency Glossary is a compilation of competencies intended for use when constructing competency models for positions in the water field. The structure of the Competency Glossary is as follows:

INTRODUCTION

- **Non-Technical Competencies**
  - Competencies for Both Individual Contributors and Managers
  - Competencies for Managers and Leaders
  - Non-Technical Foundational Competencies

- **Technical Competencies**
  - Competencies for Both individual Contributors and Managers
  - Technical Foundational Competencies

To understand the structure, it is important to explain the terms used:

**Non-technical competencies** are ones which do not depend on understanding and applying technical or field-specific knowledge and expertise. These competencies are typically acquired as a result of job experience, but without specific instruction.

**Technical competencies** do depend on understanding and applying technical knowledge and expertise. These competencies are usually acquired through specific instruction followed by on-the-job application.

Among the non-technical competencies, some, such as *Taking Initiative*, are applicable to both individual contributor positions and positions involving management and leadership. Other competencies, such as *Motivating Others*, are applicable only in jobs involving management or leadership.

**Foundational competencies**, both Technical and Non-Technical, are ones that are needed for effective performance in a job but are presumed to be already present and developed on entry into the job. Such competencies are often acquired in prior education or in a “feeder” job. Although needed for effective performance, these competencies generally already are possessed by the job holder and so don’t typically need to be developed or strengthened in the job. There are both technical and non-technical foundational competencies included here.

Within each of the sub-sections, competencies are listed alphabetically.
NON-TECHNICAL COMPETENCIES

Competencies for Both Individual Contributors and Managers

1. Communication

Definition: The ability to listen and express oneself effectively, and a concern for ensuring that people have the information needed to perform their jobs effectively.

a. Actively listens and seeks to understand others: employees, colleagues, managers and customers
b. Asks for information and help from other knowledgeable plant personnel when appropriate
c. Asks questions and shares information with other operating staff to clarify water treatment activities and problems
d. Clearly explains company policies regarding billing, initiation and termination of water service, and investigation of possible problems related to water quality and usage
e. Clearly explains to customers how their bill is calculated
f. Consistently keeps personnel on other shifts and in other units informed about ongoing water treatment processes and problems
g. Conveys to customers, both through content and tone, that he/she understands their concerns
h. Effectively explains service interruptions and impacts of water problems to customers and other stakeholders
i. Promptly notifies chain of command, when appropriate, about emerging problems
j. Responds to requests from customers and facility management for water quality data
k. Responds, personally and through staff, to concerns and complaints by customers and other stakeholders regarding water quality

2. Conceptual Thinking

Definition: The ability to apply concepts, theories and models fluently to understand complex problems and situations.

a. Applies theoretical frameworks to understand a situation
b. Develops a graphical representation of a situation, problem or system
c. Develops concepts, theories or models to understand complex situations
d. Is able to see the “big picture” in a complex situation
e. Recognizes patterns, trends or themes in situations or data
f. Steps back from a problem and views it from a broader, systemic or organizational perspective
3. Concern for Effectiveness

*Definition:* Motivation to find and implement better, more efficient and more cost-effective ways of completing work.

a. Develops more efficient or effective processes for completing work
b. Delegates work in order to use own time more effectively
c. Develops ways to speed or automate routine or repeated processes
d. Ensures that own staff are fully utilized
e. Prepares goals and agendas, to ensure effective use of time spent in meetings
f. Runs interference for own staff, by eliminating obstacles and red tape

4. Conscientiousness

*Definition:* Motivation to perform one’s job in a careful, thorough way, using prescribed procedures.

a. Adopts a daily routine to ensure timely completion of regular tasks
b. Attends to details when appropriate
c. Checks own work to ensure accuracy
d. Collects additional data for verification, when tests or observations indicate an emerging problem
e. Collects additional data for verification, when tests or observations indicate an emerging problem
f. Completes required documentation of work activities, observations and test results in an accurate and timely way
g. Demonstrates attention to detail
h. Demonstrates commitment to public service and public health
i. Demonstrates concern for precise measurement
j. Demonstrates honesty and integrity in all aspects of work
k. Demonstrates reliability and dependability
l. Ensures that employees are meeting prescribed approaches and protocols in their regular tasks
m. Ensures that safe procedures are followed
n. Ensures the accuracy and integrity of the records of own work
o. Exhibits professional pride and diligence in his/her work
p. Follows standard, prescribed approaches and protocols / SOPs for completing regular tasks and for addressing emergency situations
q. Follows standard, prescribed approaches and protocols for completing regular tasks, such as opening and closing valves, conducting repairs, water sampling, testing, and maintenance of equipment
r. Identifies and suggests areas for improvement
s. Investigates situations promptly when logs and/or employees indicate an emerging problem.
t. Keeps legible work records
u. Keeps self-alert, vigilant, and focused on the job
v. Looks beyond others’ stated needs in order to add value where appropriate.
w. Makes accurate drawings of completed “as built” repairs for permanent asset records
x. Plans work carefully in advance
y. Regularly conducts visual inspection of equipment and processes; does not rely only on process control/SCADA and/or water technology systems
z. Regularly monitors SCADA and/or water technology systems to identify trends, detect emerging problems, and prescribe future tasks
aa. Responds to alarms and developing problems with appropriate urgency
bb. Reviews logs for trends on a regular and timely basis
cc. Sets appropriate priorities for tasks
dd. Stays aware and alert at all times
ee. Takes careful notes at repair site and completes required documentation of work activities, observations and tests results in an accurate and timely way

5. Critical and Analytical Thinking

**Definition:** The ability to break down a problem in order to understand it and to think logically and systematically when solving problems and making decisions.

a. Approaches a complex task by breaking it down into a series of steps
b. Assesses and integrates multiple data points in a situation, to determine an appropriate course of action
c. Critically analyzes, compares and interprets information
d. Draws conclusions from relevant information
e. Identifies alternative causes for a problem including most likely cause(s)
f. Identifies inconsistent or missing information
g. Identifies many alternative possible causes for a problem
h. Identifies missing or needed information and the means to obtain it
i. Identifies the criteria for a good decision
j. Is able to deal with multiple variables when analyzing a problem
k. Makes purchasing decisions by systematically comparing alternatives
l. Notices discrepancies and inconsistencies in available information
m. Sets up experimental comparisons in which all conditions but one are kept the same, in order to determine whether the single varying condition causes a different result
n. Tests hypotheses to ensure that a problem is correctly diagnosed and that the best solution is found
o. Uses a step-by-step, logical process to rule out possible causes of a problem and identify its underlying cause
p. Uses a systematic approach to troubleshoot and pinpoint the causes of a problem
q. Uses scientific rules and methods to solve problems

6. Customer Focus
Appendix B: Competency Glossary

**Definition:** A central concern for understanding and addressing the needs of customers.

a. Actively seeks feedback from customers  
b. Conducts water sample analysis for customers with specific complaints  
c. Creates annual report to customers (CCR) on water quality compliance  
d. Discusses water quality issues thoroughly with customers and/or customer support staff  
e. Ensures that customer requests are promptly addressed and resolved if possible  
f. Finds and implements ways to gather feedback from customers  
g. Notifies customers and officials of temporary water main shut-off.  
h. Places a high priority on meeting customer needs  
i. Receives and listens to (personally or through staff) customer complaints  
j. Views situations from the perspective of customers

**7. Driving for Results**

**Definition:** Demonstrating concern and commitment to completing projects and achieving goals.

a. Demonstrates a strong sense of urgency about solving problems and getting the job done  
b. Demonstrates the ability to deal with multiple, concurrent problems or tasks  
c. Holds others accountable for agreed results or commitments  
d. Makes personal sacrifices when necessary to get the job done  
e. Sets clear goals and objectives for meetings and projects  
f. Stays focused on goals, despite obstacles and set-backs

**8. Flexibility and Adaptability**

**Definition:** Openness to new and different ways of doing things; willingness to modify one’s preferred way of doing things.

a. Adapts own style to the needs of the situation  
b. Adjusts to changing priorities  
c. Anticipates and accepts changes in work  
d. Demonstrates openness to new organizational structures, procedures, and technology  
e. Demonstrates willingness to modify a strongly held position in the face of contrary evidence  
f. Is able to see the merits of perspectives other than his/her own  
g. Quickly learns new assignments  
h. Refocuses attention to new assignments quickly  
i. Shifts gears and changes direction when working on multiple projects  
j. Switches to a different strategy when an initially selected one is unsuccessful

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9. Forward Thinking

*Definition*: Anticipating the implications and consequences of situations and taking appropriate action to be prepared for possible contingencies.

- a. Anticipates how customers, facility managers and staff will react to water quality situations and information and plans accordingly
- b. Anticipates how individuals and groups will react to situations and information and plans accordingly
- c. Anticipates possible problems and develops contingency plans in advance
- d. Anticipates the consequences of situations and plans accordingly
- e. Anticipates the consequences of water quality-related situations and plans accordingly
- f. Notices and analyzes trends in water regulations and water quality research and develops plans to prepare for opportunities or problems
- g. Notices trends in the industry or marketplace and develops plans to prepare for opportunities or problems

10. Influencing Skill

*Definition*: The ability to gain others’ support for one’s plans, programs or initiatives.

- a. Appeals to the greater good of the organization or the work unit
- b. Appeals to the needs and concerns of the person or group whose support is needed
- c. Enlists third parties (experts, respected colleagues) to gain people’s support
- d. Escalates an issue to higher levels of management, when appropriate, to gain compliance or support
- e. Explains the reasons for requests, to gain people’s support
- f. Gains people’s support by involving them in a process or decision
- g. Prepares strong, logical, data-based arguments to persuade others
- h. Resolves differences by helping people to understand each other’s perspective

11. Information Gathering

*Definition*: Concern for obtaining full, accurate information to guide problem solving and decision making.

- a. Identifies the information needed to clarify a problem
- b. Probes beneath the surface to understand underlying causes of situations
- c. Seeks information from multiple sources (e.g., documents, on-line resources, people) to clarify a situation or problem
12. Information Sharing

*Definition:* Concern for ensuring that effective, two-way communication occurs, so that people have the information needed to perform their jobs effectively.

a. Asks for information and help from other knowledgeable plant personnel when appropriate
b. Asks questions of other operating staff to clarify recent and ongoing water treatment activities and problems
c. Consistently keeps personnel on other shifts and affected work units informed about ongoing water treatment processes and problems
d. Creates and distributes monthly compliance report for the State (EPA)
e. Creates annual report for customers (CCR) on water quality compliance
f. Defines data needs and conducts special studies on water quality within the facility
g. Effectively communicates with all members of the team, to achieve goals
h. Keeps all parties informed of progress and all relevant changes to project timelines
i. Keeps operators and others informed about plans and activities for addressing problems affecting them
j. Maintains continual communication with plant personnel affected by his/her activities and projects
k. Maintains open communications with all levels of employees throughout the plant
l. Promptly notifies supervisor and chain of command, when appropriate, about emerging problems
m. Seeks out and questions operating personnel to clarify the need or problem to be addressed and the type of solution that is appropriate
n. Shares work-related information openly with employees and colleagues, yet maintains confidentiality where appropriate

13. Integrity

*Definition:* Concern for consistently acting in an honest, ethical way.

a. Addresses unethical behavior in others (e.g., confronts individuals, reports to management)
b. Consistently demonstrates ethical behavior
c. Is honest and forthright in his/her communications with others.
d. Keeps commitments to others
e. Protects the confidentiality of information
f. Protects the property and interests of the company
g. Respects and protects the rights of others, including co-workers and customers.
h. Takes responsibility for own mistakes
14. Interpersonal Skills

*Definition:* Skill at working effectively with other people, especially in situations where it is important to coordinate one’s work with others, to give constructive feedback, to address and resolve conflict, and to build effective working relationships.

a. Coaches and motivates colleagues to address water quality trends and issues
b. Collaborates with other units within the utility
c. Demonstrates and encourages teamwork
d. Demonstrates concern for others by being sensitive to their needs and feelings
e. Demonstrates flexibility and open mindedness when dealing with people of different backgrounds
f. Develops trust-based relationships with others
g. Involves others when making decisions
h. Keeps calm and controls own responses when dealing with angry customers.
i. Keeps calm under pressure or in emergency situations
j. Learns and uses “public image” protocols for communicating with the public in a standard way about issues
k. Pays attention to customer needs, showing empathy during service interruptions and crisis situations
l. Periodically summarizes what he/she has heard, to demonstrate listening and to check that he/she has correctly understood what the other person has said
m. Remains calm under pressure, maintaining control over emotions
n. Seeks and obtains buy-in from operators
o. Shows respect for others, regardless of position or level of authority
p. Shows understanding of others’ behavior by demonstrating appropriate responses
q. Stays calm under pressure or in emergency situations

15. Learning Orientation

*Definition:* Motivation to increase one’s knowledge and skills and build a career.

a. Accepts feedback or criticism without becoming defensive
b. Actively seeks and completes training to enhance technical skills and to keep up to date with new SCADA and/or water systems technology
c. Asks for and accepts critical feedback about his/her performance
d. Demonstrates interest in learning about new technologies
e. Introduces new approaches and technologies into work unit
f. Keeps up to date with developments in the instrumentation field
g. Recognizes and addresses own development needs
h. Recognizes when help is needed and seeks help from others
i. Seeks out new assignments, procedures and technologies
j. Seeks to learn new procedures, technologies, and instruments
k. Uses material taught in the classroom and on-the-job training in work situations
l. Works toward acquiring and maintaining certifications

16. Leveraging Diversity

*Definition:* Valuing the effectiveness to be gained by involving people with diverse backgrounds and perspectives and working to promote diversity within the organization.

a. Assures the cultural appropriateness of company communications, information, policies and procedures
b. Builds relationships with staff at all levels of the organization, from a wide range of backgrounds
c. Creates teams of people with diverse backgrounds and perspectives
d. Takes an active interest in developing diverse talent in his/her work group and larger organizational unit

17. Organizational Awareness

*Definition:* Understanding of how decisions are made within an organization – the structure, processes, politics and players.

a. Has a detailed knowledge of the formal organizational structure and procedures
b. Has a detailed knowledge of the informal organizational structure: who the real decision makers are and who can influence them; what the key players’ histories, concerns, and agendas are
c. Identifies the perspectives of various groups and key individuals on specific issues or problems
d. Keeps own manager informed and copied on sensitive matters
e. Understands and articulates how specific events and changes will affect groups and individuals in the organization
f. Understands the implications of events and decisions for various stakeholders throughout the organization

18. Persuasive Communication

*Definition:* The ability to plan and deliver oral and written communications that are impactful and persuasive with their intended audiences.

a. Creates graphics, overheads, or slides that display information clearly and with high impact
b. Identifies and presents information or data that will have a strong effect on others
c. Presents several different arguments in support of a position
d. Selects colorful stories, analogies, or examples to illustrate a point
e. Selects language and examples tailored to the level and experience of the audience

19. Planning, Organizing and Scheduling

*Definition:* The ability to plan and organize complex work projects.

a. Allocates time and resources effectively
b. Anticipates obstacles to project completion and develops contingency plans to address them
c. Completes work orders noting, for example, people, time and materials used
d. Considers how SCADA and/or water systems technology can interact with other utility-specific computer applications such as preventative maintenance programs
e. Creates annual schedule for valve exercising and hydrant flushing
f. Determines which equipment, materials, supplies, etc., are needed to complete the assignment and arranges to have them on hand or obtained in a timely manner
g. Estimates resources needed for project completion; allocates time and resources effectively
h. Is able to multi-task
i. Keeps track of details to ensure work is performed accurately and completely
j. Plans and assigns tasks so that jobs are completed on time
k. Plans and schedules tasks so that work is completed on time
l. Plans work carefully in advance
m. Prepare reports, maintains schedules and paperwork
n. Prioritizes various competing tasks and performs them quickly and efficiently according to their urgency
o. Responds to the schedules of others affected by arrangements; recognizes problems, generates effective alternatives, and takes corrective action
p. Reviews union contracts for outsourced crew members; approves payment
q. Schedules and routes crews
r. Takes necessary corrective action when projects go off-track

20. Problem Solving and Decision Making

*Definition:* The ability to find appropriate solutions to complex problems and decisions, especially ones involving conflicting pressures from different individuals and groups.

a. Assumes accountability in own area of responsibility, involving chain-of-command in decisions only as necessary
b. Balances urgency and safety in emergency situations
c. Considers a variety of perspectives when making day-to-day decisions
d. Demonstrates confidence in own abilities and judgment
e. Demonstrates ingenuity and innovative thinking in problem solving
f. Displays sound judgment  
g. Gathers information from a variety of sources  
h. Handles multiple, concurrent emergencies and/or situations  
i. Identifies and uses creative approaches, when necessary, to making repairs.  
j. Investigates emerging problem situations promptly  
k. Is able to think clearly and systematically when under pressure  
l. Questions operating personnel to better understand the problem  
m. Remains calm and thinks quickly during crises; takes a leadership role and involves others as needed to solve problems  
n. Shows versatility in addressing a variety of problems  
o. Takes ownership of water treatment plant upsets; displays tenacity for corrective measures  
p. Thinks quickly during crises, involving others, as needed, to solve problems  

21. Relationship Building  

**Definition:** Interest in and skill at developing positive relationships with others.  

a. Builds trust by listening to others and acknowledging their concerns and interests  
b. Demonstrates interest in others’ personal situations, interests and family  
c. Expresses gratitude and appreciation as a way of maintaining good relationships with people  
d. Makes others feel comfortable by responding in ways that convey interest in what they have to say  
e. Regularly communicates personally with people at all levels of the organization in order to stay connected, keep an open flow of information, and build relationships  
f. Takes time to get to know people, to build rapport and establish a bond  

22. Self Confidence  

**Definition:** Faith in one’s own ideas and ability to be successful; willingness to take an independent position in the face of opposition.  

a. Approaches challenging tasks with a “can-do” attitude  
b. Bounces back quickly from set-backs; does not dwell on failures or criticism  
c. Is confident of own ability to accomplish goals  
d. Is willing and able to say no, when necessary  
e. Is willing to speak up when he or she disagrees with a decision or strategy  
f. Is willing to step out of his/her comfort zone to accept a role or responsibility that is unfamiliar  
g. Presents self-crisply and impressively  

23. Self Control
**Definition:** The ability to maintain a calm, professional demeanor when under pressure, criticism, or attack.

- a. Accepts criticism or negative feedback without loss of self esteem
- b. Avoids the temptation to say or do things that are inappropriate
- c. Controls the impulse to respond with anger when attacked or criticized; substitutes more appropriate responses
- d. Does not dwell on setbacks or mistakes
- e. Stays calm when confronted, under attack, or in other high-stress situations

**24. Systems Thinking**

**Definition:** The ability to view a problem as part of a dynamic system of processes and parts and to use this understanding to solve the problem or make a decision.

- a. Anticipates the effects of changes in one part of a complex system on other parts of the system and on the overall process
- b. Understands the functioning of an entire process, including the role of each of its component parts
- c. Understands the relationships among the different components of a complex system

**25. Taking Initiative**

**Definition:** Originating actions to influence events and achieve goals.

- a. Gathers information from multiple sources to clarify issues
- b. Identifies what needs to be done and does it, before being asked or required to do so
- c. Personally develops a new product, service or work process
- d. Prepares in advance for contingencies
- e. Sees and acts to take advantage of opportunities
- f. Takes independent action to change the direction of events

**26. Teamwork**

**Definition:** The ability to participate and work with others as part of a team.

- a. Accepts membership in the team
- b. Applies interpersonal skills to help team achieve goals
- c. Demonstrates loyalty to the team
- d. Develops constructive and cooperative working relationships with others
- e. Effectively communicates with all members of the team to achieve goals
- f. Encourages others to express their ideas and opinions
g. Expresses disagreement constructively (e.g., by emphasizing points of agreement, suggesting alternatives that may be acceptable to the group)

h. Gives honest and constructive feedback to other team members

i. Identifies with the goals, norms, values, and customers of the team

j. Is open with other team members about his/her concerns

k. Keeps all parties informed of progress and all relevant changes to project timelines

l. Learns from other team members

m. Listens and responds constructively to other team members’ ideas

n. Offers support for others’ ideas and proposals

o. Provides assistance to others when they need it

p. Reinforces team members for their contributions

q. Responds appropriately to positive and negative feedback

r. Shares his/her expertise with others

s. Shows sensitivity to the thoughts and opinions of others

t. Works for solutions that all team members can support

27. Tenacity

*Definition:* Self-generated motivation to persevere with a task to completion.

a. Keeps focused on a goal or task for an extended period of time

b. Persists in the face of obstacles

c. Shifts to a different approach when the current one is not working

d. Works long hours when necessary to complete a task or meet a deadline

28. Working Independently

*Definition:* The ability to work effectively in a job or role where one must be able to function alone, without the company or guidance of a supervisor or co-workers.

a. Is able to make decisions in own area of responsibility, without relying on a supervisor, but understands the point at which it is necessary to contact a supervisor

b. Is able to work alone, without close supervision

c. Takes initiative in identifying and completing necessary tasks

*Competencies for Managers and Leaders*

29. Change Management

*Definition:* Initiating, sponsoring or championing change, and helping others to successfully adapt to the changes.

a. Establishes structures and processes to plan and manage change
b. Helps people to develop a clear understanding of the impact on them and the organization of proposed or pending changes
c. Seizes opportunities to influence the future direction of an organizational unit or the overall company
d. Takes the lead in setting new business directions, policies or procedures

30. Creating a Positive Work Environment

Definition: The ability to manage and lead a group in a respectful, engaging way.

a. Acknowledges and thanks people for their efforts and contributions
b. Asks for the views of all participants in meetings
c. Asks team members for their views, before sharing his/her own view
d. Assigns and delegates based on strengths
e. Demonstrates and encourages teamwork
f. Expresses confidence in people’s ability to master new roles and challenging situations
g. Focuses the team on learning from setbacks, rather than on identifying who is to blame
h. Identifies and promptly tackles morale problems
i. Involves team members in decisions
j. Leads by example
k. Provides people with access to the information they need to do their jobs
l. Seeks out the perspectives of all parties involved in a situation
m. Treats people with respect and insists that team members do the same

31. Decisiveness

Definition: Willingness to make difficult decisions in situations involving uncertainty or risk.

a. Is willing to make decisions in difficult or ambiguous situations, when time is critical
b. Makes tough decisions (e.g., closing a facility, reducing staff, accepting or rejecting a high-stakes deal)
c. Takes charge of a group when it is necessary to facilitate change, overcome an impasse, face issues, or ensure that decisions are made
d. Takes risks or unpopular stands to do what is right for the organization, its employees, or its customers

32. Developing Others

Definition: Willingness to delegate responsibility and to work with others to develop their capabilities.
a. Asks questions of employees to find out what is important to them and how they feel about their development
b. Encourages employees to move out of their comfort zone and accept new and more challenging assignments
c. Gives people assignments that will help develop their abilities
d. Helps people to reflect on and learn from their successful and less successful projects
e. Provides helpful, behaviorally specific feedback to others
f. Recognizes and reinforces people’s developmental efforts and improvements
g. Regularly meets with employees to review their development progress
h. Shares information, advice and suggestions to help others to be more successful

33. Establishing Focus

*Definition:* The ability to develop and communicate a compelling mission for an organizational unit, based on an understanding of where the organization is headed.

a. Acts to align own unit's goals with the strategic direction of the organization
b. Creates a mission for his/her unit, based on an understanding of where the larger organization is headed
c. Ensures that everyone understands and identifies with the unit's mission
d. Ensures that people in the unit understand how their work relates to the mission and strategy of the organization
e. Ensures that the unit develops objectives and a plan to fulfill the unit's mission

34. Fostering Teamwork

*Definition:* Interest and skill in getting groups to work together cooperatively.

a. Asks for and values the ideas of all team members
b. Clarifies roles and responsibilities of team members
c. Enlists the active participation of everyone
d. Ensures that all team members are treated fairly
e. Helps the team to develop a shared vision of its purpose and goals
f. Involves team members in defining the work to be done and deciding how it will be accomplished
g. Promotes cooperation with other work units
h. Provides opportunities for people to work together as a team
i. Recognizes and encourages the behaviors that contribute to teamwork

35. Managing People’s Performance

*Definition:* Ensuring that employees understand and fulfill their responsibilities as employees and team members.
a. Addresses conflicts among employees before they impact performance  
b. Allows employees to decide how they will complete their work  
c. Applies progressive discipline procedures as needed  
d. Deals firmly and promptly with performance problems; lets people know what is expected of them by when  
e. Encourages employees to work together to achieve team goals  
f. Holds people accountable for adhering to policies and practices  
g. Holds people accountable for meeting performance expectations  
h. Keeps informed about employees’ progress and performance through both formal methods. (e.g., status reports) and informal methods (e.g., management by walking around)  
i. Monitors crew members’ progress and performance  
j. Provides clear instructions to employees regarding roles and tasks  
k. Provides instruction and coaching as needed to help employees improve performance  
l. Provides specific, timely feedback on performance  
m. Sets clear expectations about performance: goals and standards for the quality of work  
n. Shares and explains personnel policies and procedures to employees  
o. Supports employees in their efforts to achieve job goals (e.g., by providing resources, removing obstacles, acting as a buffer)  
p. Tracks progress of individual employee performance  
q. Treats employees fairly and logically, using a consistent set of performance standards  

36. Managing Work Tasks and Projects  

Definition: The ability to manage the implementation of project work to ensure its timely and effective completion.  

a. Delegates work to persons who are ready to assume greater responsibility  
b. Identifies and removes obstacles that impede the group’s work  
c. Maintains availability to staff, to answer questions and resolve problems  
d. Monitors task progress and redirects efforts as needed, to achieve project goals  
e. Plans and coordinates projects with groups affected by the project  
f. Plans and holds effective meetings  
g. Sets and maintains high standards of performance  

37. Motivating Others  

Definition: Skill at enhancing others’ commitment to their work.  

a. Acknowledges and thanks people for their contributions  
b. Creates symbols of group identity
c. Expresses confidence in people’s ability to master new roles and challenging situations

d. Expresses pride in the group and encourages people to feel good about their accomplishments

e. Finds creative ways to make people's work enjoyable

f. Identifies and promptly tackles morale problems

g. Meets individually with direct reports and asks about their goals and motivations.

h. Recognizes and rewards people for their achievements

i. Signals own commitment to a process by being personally present and involved at key events

j. Stages celebrations for group accomplishments

38. Strategic Perspective

*Definition:* The ability to take a long-term view of an organization’s strengths and weaknesses in the context of industry, market and competitive trends.

a. Articulates what is needed from a long-term perspective to position the organization for the future

b. Assures that own unit’s mission and objectives are aligned with those of the organization

c. Keeps informed about the external environment (industry, market, economy, competitors, and regulatory issues) and effects on the company

**NON-TECHNICAL FOUNDATIONAL COMPETENCIES**

*Note:* The competencies in this section are generally assumed to be present when an employee starts in a position. These are basic requirements for effectiveness that do not usually contribute to superior performance. It is expected that people will have developed these competencies during their previous education (e.g., high school, technical school) and in part-time job experiences prior to taking a full-time position.

39. Ability to Learn

*Definition:* Incorporating classroom and on the job training into work performance.

a. Applies information provided in training to work tasks

b. Desires and shows willingness to learn new assignments, procedures, and technologies

c. Uses material taught in classroom and on the job training in work situations

40. Dependability and Reliability

*Definition:* Displaying responsible behaviors at work.
a. Comes to work when scheduled and on time  
b. Complies with company policies  
c. Does not attend to personal business while on the job  
d. Fulfills obligations of the job  
e. Manages stressful situations effectively

41. Following Directions

*Definition:* Receiving, understanding, and carrying out assignments or following Standard Operating Procedures with minimal supervision.

a. Acts upon the instruction to complete an assignment  
b. Asks questions to clarify unclear directions  
c. Interprets complex instructions and their relevance to the work assignment  
d. Picks out important information in verbal messages  
e. Receives, interprets, understands, and responds to verbal messages and other cues

42. Listening

*Definition:* Attending carefully to others in order to understand what they are saying.

a. Asks questions when necessary to clarify own understanding of what has been said  
b. Correctly interprets information provided by others  
c. Listens carefully and with full attention to others

43. Oral Communication

*Definition:* Speaking English well enough and clearly enough to be understood by supervisors, co-workers, and customers.

a. Keeps language simple and appropriate for the audience’s level of knowledge of the subject  
b. Speaks clearly, in precise language, and in a logical, organized, and coherent manner  
c. Uses standard sentence structure and appropriate grammar

44. Physical Dexterity

*Definition:* The ability to use fine motor coordination to operate tools.

a. Is able to use hands and fingers to perform delicate manual tasks  
b. Operates hand tools effectively
45. Physical Strength

*Definition:* The ability to lift and carry heavy loads and to exert force with arms, legs, hands, and body.

a. Effectively exerts force with arms, hands, legs and body, when needed to move heavy equipment or materials
b. Lifts heavy equipment or materials

46. Professionalism

*Definition:* Maintaining a professional presence and adhering to ethical standards.

a. Demonstrates self-control by maintaining composure and keeping emotions in check even in difficult situations
b. Maintains a positive attitude
c. Maintains a professional appearance by dressing appropriately for the job and maintaining personal hygiene
d. Refrains from substance abuse
e. Takes pride in one’s work and the work of the organization
f. Uses professional language when speaking with supervisor, co-workers, and customers

47. Reading

*Definition:* The ability to understand written material and to use written material to find information needed in one’s job.

a. Applies what is learned from the written material to complete specific tasks
b. Correctly interprets written material
c. Integrates what is learned from written materials with prior knowledge
d. Is able to identify main ideas in written material
e. Scans written material for subjects of interest
f. Sorts through distracting information

48. Written Communication

*Definition:* The ability to express oneself clearly in writing.

a. Clearly develops ideas and elaborates on them with relevant supporting examples and specific details
b. Communicates thoughts, ideas, and information which may contain technical material in a logical, organized, and coherent manner
c. Creates documents such as work orders or memos
d. Uses standard syntax and sentence structure, correct spelling, punctuation and capitalization, and appropriate grammar

e. Writes clearly and concisely in a professional and courteous manner

f. Writes effectively for a variety of audiences

TECHNICAL COMPETENCIES

1. Analytical Laboratory Methods

Applying knowledge and expertise during the performance of job responsibilities in the following areas:

a. Adhering to safe laboratory procedures
b. Documentation and record keeping of sample procedures and results
c. Following Standard Operating Procedures for methods
d. Methods for sampling, and preserving water samples
e. Performing analyses on water samples for parameters such as pH, temperature, fluoride, hardness, disinfectant residuals and organic contaminants

2. Computer Skills

Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:

a. Company-specific system for recording and tracking water testing
b. Comprehensive knowledge of computer applications, including databases, spreadsheets, and word processing
c. Excel spreadsheet data entry
d. GIS, Computer design software expertise
e. Hardware
f. Instrument specific applications for water treatment analysis
g. Microsoft Office applications
h. Microsoft Word applications
i. Plant-specific and industry-specific applications
j. Software applications
k. Software programs and systems for managing plant processes and operations
l. Use of plant-specific preventative and maintenance management systems
m. Using site-specific computer system for managing billing
n. Using site-specific software applications for maintenance and repair work, which includes creating work orders, scheduling, routing, and documentation
o. Using software applications for communication and searching for information on the internet.
p. Using software to track schedules, budgets and inventory
3. Billing Systems and Procedures

Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:

a. Comparing a recent bill to the customer’s previous usage to assess whether there may be a problem with the bill or with the system supplying water to the customer’s home or business
b. Explaining company policies related to turning on and off water
c. Explaining customer bills to customers

4. Engineering Skills

Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:

a. Engineering problem solving methodology
b. Knowledge of construction techniques used in system specific projects
c. Principles of engineering

5. Equipment Repair Procedures

Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:

a. Disassembling and rebuild equipment
b. Fabricating parts and tools for repairs
c. Implementing manufacturer’s directions
d. Recognizing malfunctioning equipment
e. Shoring and trenching to support underground equipment repair
f. Troubleshooting malfunctions
g. Using precision measuring tools

6. Hydraulics (Basic Expertise)

Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in this area.

7. Instrumentation Principles

Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:

a. Electricity (In-depth Expertise)
b. Hydraulics (Basic Expertise)
c. Pneumatics (Basic Expertise)

8. Laboratory Equipment and Instrumentation

Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:

a. Maintenance and documentation of instrumentation
b. Proper operation of instrumentation for testing water samples

9. Machinery Preventive/Predictive Maintenance Procedures

Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:

a. Lubricating, inspections, gauge checking, vibration analysis and oil analysis
b. Standard operating procedures

10. Managing Human Resources issues and policies

Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:

a. Conflict resolution methods
b. Personnel policies and procedures
c. Union contract terms, where appropriate

11. Mechanical Systems Used In Water Utilities (In-Depth Expertise)

Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:

a. Hydrants
b. Pumps and motors
c. Storage facilities – tanks, reservoirs
d. Transport systems (hard pipe, tubing)

12. Process Control System for Water Treatment at Jobholder’s Facility

Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:

a. Considering alarm trigger points in use by operating personnel
b. Following regulatory parameters used for process control
c. Process equipment used in the treatment and distribution systems (Basic Expertise)
d. Understanding what the operator monitors, the goals of the process, and how he/she controls process

13. Project Planning and Management

Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:

a. Approval of change orders
b. Developing and managing project budgets
c. Estimating project costs
d. Tracking expenses on in house and consultant projects

14. Quality Control and Continuous Improvement

Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:

a. Applying quality control and continuous improvement processes used at the site
b. Ensuring application of standard operating procedures used at the site
c. Understanding of concepts, principles and methods used in quality control and continuous improvement

15. Quality Control Procedures

Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:

a. Obtaining precise, accurate measurements
b. Quality control procedures used in instrumentation
c. Quality control procedures used in water testing, analysis and treatment, general and system-specific

16. Reading Plats, Maps, Plans and Drawings

Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:

a. Geographical Information Systems (GIS) (Basic Expertise)
b. Making drawings of “as built” conditions after construction and repair
c. Measuring site and equipment specifications
d. Obtaining information to locate, plan and work activities
17. Safety Requirements and Procedures

*Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:*

a. Ensuring that system-specific safety requirements are followed

18. Security And Safety Procedures

*Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:*

a. Ability to assume responsibility for maintaining a safe working environment  
b. Awareness of impact of actions on entire system  
c. Electrical and mechanical machinery and equipment protection  
d. Ensuring crew has protective equipment, safe tools and properly trained, including first aid  
e. Federal (OSHA), State and local laws and regulations pertaining to hazardous materials  
f. Laboratory emergency procedures and protocols  
g. Lock out/tag out procedure for safe operations  
h. Personal safety equipment and procedures  
i. Traffic control regulations  
j. Traffic control warnings and equipment  
k. Treatment plant emergency procedures and protocols  
l. Understanding of health and safety regulations, e.g., Safe Drinking Water Act

19. Sub-Systems and Languages Comprising a SCADA and Other Water Treatment Technology Systems, how they interact and in maintaining and upgrading them as required (In-Depth Expertise)

*Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:*

a. Communication pathways  
b. Computer data acquisition systems  
c. Human machine interface (HMI)  
d. Maintaining the sub-systems and languages  
e. Programmable logic controllers (PLCs)  
f. Remote terminal units (RTUs)  
g. Understanding the interactions among the sub-systems and languages  
h. Upgrading the sub-systems and languages
20. Supervisory Control and Data Acquisition Systems (SCADA) and Other Related Systems Used in Water Treatment and Distribution (In-Depth Expertise)

Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:

a. Configuring/programming the system to integrate new process control functions
b. Designing and configuring systems within a network platform, including consideration of switches, routers, and firewalls
c. Supporting, operating, and maintaining the systems, processes and technology

21. System-Specific Expertise (In-depth)

Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:

g. Intranet/server system, devices, and security
h. Software systems used, including process control languages, databases, spreadsheets, work management software, and word processing
i. Instrumentation and communications
j. Safety requirements and procedures
k. Treatment processes used at Jobholder’s Facility (In-depth Expertise)
l. Organization of the facility
m. Ability to assume responsibility for emergency operating procedures for the treatment plant, including start-up and shut-down
n. Safety requirements and procedures and the ability to assume responsibility for maintaining a safe working environment
o. Regulations and related requirements relevant to the operation of the water treatment process
p. Required sampling procedures and reporting requirements
q. Ensuring that all staff understands the importance of consistent compliance with all regulations
r. Equipment and machinery used in the facility’s distribution system

22. Technology Communications Expertise

Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:

a. Devices (fiber optic, cable, cell phone, radio, satellite)
b. Methods (Ethernet, internet)
23. Troubleshooting SCADA and Other Technology Systems (In-Depth Expertise)

Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in this area.

24. Water and Health Regulations

Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:

d. Addressing water-borne bacteria and chemical toxicity issues on a system-wide level

e. Procedures and Regulations and related requirements relevant to the operation of the water treatment process
   1. Required sampling procedures and reporting requirements
   2. Ensuring that all staff understands the importance of consistent compliance with all regulations
   3. Personal safety equipment and procedures

f. Site-specific compliance with Safe Drinking Water Act, Clean Water Act and State water quality regulations

25. Water Distribution Systems

Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:

a. Collecting water samples, conducting basic tests using standard water testing procedures, and interpreting the test results

b. Cross connections and approved backflow methods and devices.

c. Electrical and mechanical principles underlying system infrastructure operations (Basic Expertise)

d. Following emergency operating procedures applicable to the system

e. Following regulatory requirements that affect the operation and maintenance of the distribution system

f. Function of water mains, hydrants, valves and other appurtenances

g. Hydraulic and pneumatic principles, fluid characteristics, pressure zones and use of control systems (Basic Expertise)

h. Interpreting data from water sample results

i. Main flushing procedures

j. Operating, calibrating, maintaining, trouble-shooting, and diagnosing system-specific infrastructure components and equipment

k. Performing start-up and shut-down operations

l. Performing system-specific storage tank turnover operations.

m. System-specific storage tank turnover operations

n. Using system-specific materials and equipment in the distribution system
26. Water Quality Problems

Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:

a. Recognizing basic water quality problem indicators (such as taste, odor, turbidity, and color)

b. Recognizing chemical and pressure problems

c. Taking appropriate measures to address the problems

27. Water Treatment Principles and Practices

Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:

a. Function of water treatment systems and plant unit processes
   1. What to monitor and how to control the process
   2. Process equipment and chemicals used in treatment
   3. Effects of changes in water treatment on water quality
   4. Effects of water quality changes on water treatment processes
   5. Principles of filter operation

b. Collecting water samples, completing basic analyses using standard water testing procedures, interpreting the test results, and making process adjustments based on those interpretations

c. Interpreting water sampling test results, and making process adjustments based on those interpretations

d. Obtaining and interpreting information shown on whole systems technology (e.g. SCADA) screens and using the information to adjust processes

e. Obtaining and understanding information shown on SCADA screens and using the information to adjust processes

f. Performing emergency operating procedures for the treatment plant

g. Performing safety requirements and procedures

h. Regulations affecting water treatment and distribution

i. Regulations relevant to the operation and performance of the water treatment process and the duties of the operator’s position

j. Understanding and/or performing basic maintenance procedures for filters, pumps and other water treatment plant equipment

k. Water treatment plant unit processes (filters, mixing chambers, etc.)

28. Water Treatment / Distribution System Processes and Procedures (Basic Expertise)

Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:
a. Explaining to customers how the water treatment and distribution system works  
b. How water treatment works  
c. Regulations affecting water treatment and distribution  
d. Water treatment plant unit processes (filters, mixing chambers, etc.)  

29. Water Treatment System / Distribution System  

*Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:*  

a. Application of analytical methods, instrument calibration frequencies, and documentation required by regulation  
b. General understanding of how system works  
c. Regulatory implications of data  
d. Using instruments and generating data  

30. Water Treatment Systems Instrumentation  

*Applying knowledge and expertise during planning, decision making, problem solving and performance of job responsibilities in the following areas:*  

a. Performing routine maintenance, calibration and repair on instrumentation  
b. Process analytical instruments used in water plant and distribution system  
c. Programmable logic controllers (PLCs) (Basic knowledge)  
d. Suppliers and vendors of instruments and repair parts  
e. Understanding the role of each instrument in the whole water treatment process  

FOUNDATIONAL TECHNICAL COMPETENCIES  

*Note: These are competencies that are usually expected to have been acquired before entry into workplace jobs. Workplace training is uncommon for these jobs.*  

1. Analytical Laboratory Methods: Comprehensive knowledge and practice in scientific methods for sampling, testing and documentation; up-to-date laboratory compliance practices *(Add to Competency Glossary)*  
2. Computer Skills (Basic Expertise)  
   a. Internet search  
   b. Email correspondence  
3. Biology  
4. Chemistry  
5. Construction skills  
6. Control System Platforms (PLCs, RTUs)  
7. Electrical skills  
8. Electricity (Basic Expertise)
9. Electronics (Basic Expertise)
10. Engineering Skill
11. Environmental Regulations: Comprehensive knowledge of environmental law, including the Safe Water Drinking Act and its implications
12. Hydraulic systems (Basic Expertise)
13. Mathematics (Basic Expertise), including unit conversions and the metric system, use of formulas
14. Mechanical Ability (Basic Expertise)
15. Mechanical Aptitude and Dexterity
16. Mechanical skills (Basic Expertise)
17. Methods and practices used for the installation, calibration, maintenance, and repair of instrumentation equipment.
18. Microbiology
19. Network Architecture
20. Plumbing Skills
21. Pneumatics (Basic Expertise)
22. Process and Instrumentation Diagrams (P&IDs) and Loop Diagrams.
23. Reading Blueprints, Technical Documents, and Equipment Specifications
24. Reading and interpreting technical manuals and technical drawings
25. Safety Awareness
26. Science (Basic Expertise), including Chemistry and Biology
27. Shop practices (Basic Expertise)
28. Using hand tools and power tools
APPENDIX C:  
JOB DESCRIPTION TEMPLATE

[Job Title]

Purpose of This Job:

Position to Which This Job Reports:

Main Responsibilities:

Essential Skills:  (Select key ones from Foundational Competencies section of Competency Model)

Desirable Skills: (Select from main section of Competency Model)

Supervisory Responsibility: (number of persons supervised and their roles):

Decision-Making Responsibility:

Educational Degrees or Certifications Required:

Previous Work Experience Required:

Travel Requirement:

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APPENDIX D:
COMPETENCY MODEL TEMPLATE

Competency Model

[Title of Job or Set of Jobs]
[Date]

I. Technical Competencies

1. [Name or Domain of First Technical Competency]
   a. [Sub-domain #1]
   b. [Sub-Domain]
   c. [Etc.]

2. [Name or Domain of Second Technical Competency]
   a. [Sub-domain #1]
   b. [Sub-Domain]
   c. [Etc.]

[Add other technical competencies in same format 1 and 2]

II. Non-Technical Competencies

1. [Name of first non-technical competency]
   a. [First behavioral indicator for this competency]
   b. [Second behavioral indicator for this competency]
   c. [etc.]

2. [Name of second non-technical competency]
   a. [First behavioral indicator for this competency]
   b. [Second behavioral indicator for this competency]
   c. [etc.]

3. [Insert additional non-technical competencies in same format as above]

III. Foundational Competencies (Mostly expected on entry into the position)

   Technical Foundational Competencies
   1. [Name of first Technical Foundational Competency]
   2. [Name of second Technical Foundational Competency]
   3. [etc.]

   Non-Technical Foundational Competencies
   1. [Name of first non-technical foundational competency]
   2. [Name of second non-technical foundational competency]
3. [Etc.]

IV. Competencies Leading to Superior Performance
1. [Name of first competency]
2. [Name of second responsibility]
3. [Etc.]
4. [Optional statement describing how these competencies can be used in combination to achieve superior performance.]

V. Most Important Responsibilities
1. [Name of first main responsibility]
2. [Name of second main responsibility]
3. [Etc.]
REFERENCES


Water Sector Competency Model. www.careeronestop.org
ABBREVIATIONS

ABC  Association of Boards of Certification
AwwaRF  Awwa Research Foundation (Previous name of Water Research Foundation)
EPA  United States Environmental Protection Agency
PLC  Programmable logic controllers
RTU  Remote terminal units
HMI  Human machine interface
P&ID  Process and Instrumentation Diagram
SCADA  Supervisory Control and Data Acquisition
U.S.  United States
WaterRF  Water Research Foundation