



Combustion Turbine Technician Skill Standards

***POWER GENERATION
SKILL STANDARDS***

Combustion Turbine Technician

FOR MORE INFORMATION

Barbara Hins-Turner
Executive Director
Center of Excellence for Energy Technology
Centralia College
600 W. Locust
Centralia, WA 98531-4099
Phone: 360-736-9391, extension 477
bhins-turner@centralia.edu

COPYRIGHT © 2009

State of Washington through the State Board for Community and Technical Colleges

Unless otherwise provided, data which originates from this agreement, shall be “works for hire” as defined by the U.S. Copyright Act of 1976, and shall be owned by the State of Washington. Data shall include, but not be limited to, reports, documents, pamphlets, advertisements, books, magazines, surveys, studies, computer programs, films, tapes, and/or sound reproductions. Ownership includes the right to copyright, patent, register, and the ability to transfer these rights.

PROJECT FUNDING

This project was made possible through funding to the Washington State Center of Excellence for Energy Technology by Puget Sound Energy.

PERMISSION TO

General permission is granted for educators to photocopy and quote limited material from this document for noncommercial instructional or scholarly use. Permission must be sought from the Washington State Board for Community and Technical Colleges in order to charge for photocopies, to quote material in advertising, or to reprint substantial portions of the document in other publication. Credit should always be given to the source of the photocopies or quotes by citing a complete reference.

TO ORDER ADDITIONAL

Additional copies of the document are available for \$20.00 plus shipping and handling fees. Use the order form at the back of this document. Proceeds from sales are applied to reprinting this document.

DOCUMENT CREDITS

Project Director, Alan Hardcastle Ph.D., WSU Extension Energy Program, (360)-956-2167 or hardcast@wsu.edu

Document and lead technical writing by Terryll Bailey, The Allison Group 206-525-7175 or tbailey@theallisongroup.com.

Project Coordinator, Barbara Hins-Turner Executive Director, Center of Excellence for Energy Technology

Scenarios by Larry Hull, Portland General Electric

Acknowledgement

This document is the result of the collaborative efforts of industry, labor, education, government, workforce and economic boards successfully working together through the Centralia College Center of Excellence for Energy Technology partnership. The Combustion Turbine Specialist Skill Standards document could not have happened without the support of all partners. Literally, thousands of hours were invested. A special thanks to all who contributed, and especially to Dr. Alan Hardcastle, Washington State University Senior Researcher, Terryll Bailey, President, The Allison Group, IBEW Local #77 and the employers who encouraged their workers to participate in their focus groups. Their countless hours of work on this project are greatly appreciated.

Washington State Workforce Training and Education Coordinating Board

- Eleni Papadakis, Executive Director
- Mike Brennan, Economic Development Program Specialist

Washington State Board for Community and Technical Colleges

- Jim Crabbe, Director, Workforce Education
- Amy Smith-Rubeck, Workforce Education Policy Associate

Project Development and Coordination

- Alan Hardcastle, Ph.D., WSU Extension Energy Program
- Terryll Bailey, The Allison Group
- Barbara Hins-Turner, Washington State Center of Excellence for Energy Technology
- Debbie Breon and Vicki Zarrell, WSU Extension Energy Program

The Steering Committee

- Troy Nutter, Puget Sound Energy
- Tom Lindmark, Portland General Electric
- Mike Adams, Invenergy
- Mike Shores, Puget Sound Energy
- Todd Gatewood, Invenergy
- Gerald Klug, Puget Sound Energy
- Charles Morton, Puget Sound Energy

Special Thanks

The Combustion Turbine (CT) Skill Standards project was launched at the Satsop Development Park/Regional Education and Training Center, where industry training supervisors, plant managers and labor representatives determined the scope of the CT skill standards project. Employers and the focus group participants listed below then invested two full days to develop the CT standards during meetings held at Puget Sound Energy's Olympia service center facility in early 2009.

The resource costs for this project were high, but the results provide a knowledge capture of the skill needs of CT specialists that will serve industry, labor and educational needs well, and provide an important benchmark for ensuring education and training excellence across the state. We sincerely thank our industry and labor partners for supporting this work, and especially Troy Nutter, Manager of Training and Procedures at Puget Sound Energy. Many thanks to the following organizations:

Puget Sound Energy
Grays Harbor Energy Inc, LLC
Portland General Electric
Invenergy
IBEW Local # 77

Focus Group Participants

The focus groups consisted of front-line combustion turbine technician/specialists and subject matter experts from regional employers representing the power generation industry within the Pacific Northwest power grid. They determined the critical work functions and key activities performed by CT specialists. They then listed the performance indicators, technical knowledge, skills and abilities, and employability skills required to succeed in this field. Their insights and invaluable contributions to this work cannot be overstated.

Larry Hull, Portland General Electric
Nathan Fadden, Puget Sound Energy
Bryan Baumgartner, Puget Sound Energy
Daniel Chapman, Puget Sound Energy
Kevin Guiney, Puget Sound Energy
Joshua Gregg, Portland General Electric
Todd Gatewood, Grays Harbor Energy Inc. LLC
Reuben Bishop, Puget Sound Energy

The Combustion Turbine Skill Standards Project Outcomes

The following are the outcomes of *Combustion Turbine Specialist Skill Standards*, as determined by the partnership:

- Skill standards needed for CT specialists and careers consistent with the current and future needs of the public and business
- Verification of the standards by worker input using a written survey
- A report for CT employers, labor unions and educators showing the standards and the data and processes that supported development of the standards

The Next Steps

The completion of the skill standards represents phase one of this endeavor. The next step is to provide oversight to the development of curriculum based on the skill standards. Achieving this objective will require continuation of this cooperative and collaborative partnership with power generation industry, labor unions, high schools, and colleges throughout the state. Additionally, the skills standards will serve as a foundation for development of Credit for Prior Learning and industry human resource job requirements.

Table of Contents

OVERVIEW

Introduction and Perspectives
Executive Summary
The State of the Industry

NATIONAL CONTEXT

A National Context for Skill Standards
 What Are Skill Standards?
 Why Are Skill Standards Important?
 The Benefits and Uses of Skill Standards
Skill Standards to Curriculum: A Continuous Development Process
Pyramid of Competencies

POWER GENERATION SKILL STANDARDS PROJECT

Project Goals, Guiding Principles and Methodology
Employability Skills: SCANS Profile
Definition of Terms

RESULTS: Skill Standards for Combustion Turbine Technician

Typical Job Description
Scenarios: Routine, Crisis and Long Term
SCANS Survey Results
Summary of Critical Work Functions and Key Activities
Theories and Concepts
Verification Survey Results
Skill Standards

INTEGRATION

Assessment and Certification: A Vital Connection
Assessment Strategies
Assessment Design

APPENDICES

References
Ordering Information

OVERVIEW

Introduction

The State of the Industry

OVERVIEW

Introduction

The Combustion Turbine Skill Standards is the result of a collaborative project led by the Centralia College Center of Excellence for Energy Technology. The initial work on Energy Industry Distribution Skill Standards for Electricians, Lineman, Instrument/Control/ Relay/Meter Technician and Millwright was conducted in 2003 by Walla Walla Community College. Skill standards projects conducted in 2006 led by the Centralia College Center of Excellence for Energy Technology produced sets of standards for Power Plant Operators and Plant Mechanics. More recently, standards for Power Plant Electricians and Wind Turbine Technicians have been produced.

The Combustion Turbine (CT) Skill Standards serve as companion documents to create a standard for curriculum development, skills training and human resource needs for energy production and distribution. Bonneville Power Administration (BPA) has developed a set of skill standards that will serve the transmission needs of the Pacific Northwest power grid. Collectively, the skill standards will continue to be expanded by position to standardize the knowledge management processes for power generation, transmission and distribution.

The State of the Industry

***Troy Nutter, Manager of Training and Procedures
Puget Sound Energy
Bellevue, WA***

The mix of energy resources has steadily been changing over the last decade and has increased in tempo with the passing of I-937 in Washington State and the Renewable Energy Portfolio requirements.

The “thermal” assets have been identified as a major part of supporting future wind integration in the Pacific Northwest in the near term. Combustion turbine technology and combined cycle technology are moving forward as a cleaner alternative on our way to zero carbon energy resources.

Combined cycle CT plants are a complex maze of inter-related systems operating and relying on each other for clean, environmentally compliant, efficient and reliable operation. The role of the combustion turbine journey worker presents a requirement for a highly technical combination of knowledge, skills and abilities to reliably operate and maintain plants to meet the needs of industry, electrical rate payers and customers.

Puget Sound Energy collaborated with the Center of Excellence for Energy Technology and Washington State University’s Extension Energy Program to objectively identify and quantify the required knowledge, skills and abilities for the occupation through development of an occupation skill standard under the National Skill Standards model. PSE will use this information to refine and improve our registered apprenticeship standards and tasks to accurately reflect the needs of the occupation.

From a broader perspective, skill standards can be used by others in industry, academia, workforce development and jobs skills training to develop programs and pathways to careers in the Combustion Turbine world for persons new to the work force, incumbent workers seeking to improve skills, displaced workers as they transition to new occupations and seek to fill skill gaps, returning and discharged veterans seeking to crossover to civilian jobs yet use their valuable skills to their benefit.

This skill standard is one of many produced by the primary efforts of Dr. Alan Hardcastle and Terryll Bailey in the energy industry as part of an on-going effort raise the awareness of the requirements for employees to be successful, industry to be more efficient and reliable and family wage jobs. But the major accomplishment of skill standards developed under this model is the collaboration of education, labor, industry and government to produce this document.

Finally, skill standards are an integral part of the Energy Competency model and help to create the strong foundational structure for workforce development in the energy industry as we move forward toward a zero carbon and an energy independent future.

Message from Labor

Bob Guenther, President, Thurston, Lewis, Mason, Central Labor Council, Vice President, 3rd District Washington State Labor Council, AFL/CIO, Lobbyist, IBEW Local #77

Skill Standards enable predictive thinking on future industrial needs. Establishment of skill standards offers continuous improvement for current business needs and at the same time provides opportunities for workers to bring skills to the workplace that ensures quality training to make business profitable. The attainment of the goals of skill standards also provides an opportunity for labor to negotiate in good faith the wages that their expertise has earned. History has shown that industrial accident frequency continues to decline through good workforce training. Skill standards provide the foundation for providing a safe and skilled workforce for Washington State, the region and our nation as a whole.

I am proud of Organized Labor's participation in this combustion turbine skill standards project.

NATIONAL CONTEXT

A National Context for Skill Standards

What Are Skill Standards?

Why Are Skill Standards Important?

The Benefits and Uses of Skill Standards

Skill Standards to Curriculum: A Continuous Development Process

Pyramid of Competencies

National Context for Skill Standards

The National Skill Standards Board (NSSB) was established by Congress in 1994 to encourage the creation and adoption of a national system of voluntary skill standards that would enhance the ability of the U.S. to compete effectively in a global economy. By the time the NSSB sunset in 2003, several national voluntary skill standards projects were developed by various industries in full partnership with education, labor and community-based organizations. The intent was to have voluntary skill standards that are flexible, portable, and continuously updated and improved.

What Are Skill Standards?

Skill standards are performance specifications that identify the knowledge, skills and abilities an individual needs to succeed in the workplace. They are critical to improving workforce skills, raising living standards and improving the competitiveness of the U.S. economy. To be effective, skill standards must reflect the consensus of power generation professionals.

Skill standards provide measurable benchmarks of skill and performance achievement. They answer two critical questions: What do workers need to know and be able to do to succeed in today's workplace? And, how do we know when workers are performing well? Without this fundamental information, employers do not know whom to hire or where to focus their limited training dollars; employees and new entrants to the workforce do not know what they need to do to improve their performance; educators do not know how to prepare students for the challenge of the workplace.

Why Are Skill Standards Important?

In today's workplaces, the only constant is change. Jobs that once were relatively simple now require high performance work processes and enhanced skills. Because skill standards reflect changing workplace realities, they are a tool that can be used by applicants and employees to access greater career opportunities.

National recognition of skill standards in career fields provides a common basis for certifying achievement against those standards, thereby allowing for the portability of skills across geographic areas, companies and careers.

Updating skills and knowledge is now a lifelong endeavor, causing many employers and employees to spend more effort, time and money on education and training. Skill standards provide benchmarks for making education and training decisions, shaping curricula and directing funds toward highest value education and training investments.

The Benefits and Uses of Skill Standards

Skill standards benefit all the stakeholders—business, labor, educators, government, and the community. The success of a skill standards development project and its usefulness to the community is dependent on the full participation and commitment of all stakeholders. These benefits can be used as a benchmark for evaluating the effectiveness of collaborative efforts.

How Skill Standards Benefit Employers

Employers can use skill standards to establish personnel qualification requirements. Interviews, performance reviews and productivity can be evaluated and assessed to a higher degree of accuracy and efficacy. Employers are also able to identify core competencies and workers' abilities to demonstrate competencies. By matching competencies to critical work functions and key activities, employers can significantly improve efficiencies and productivity. Performance-based skill standards also provide a vehicle for varying degrees of job certainty and the structure for establishing competency-based pay scales. In addition, employers use skill standards to:

- Align personnel qualification requirements with nationally adopted certificates of competence.
- Modify employee training.
- Simplify measurement of employee training effectiveness.
- Assess employee skill levels based on industry standards.
- Match employee skills to the work needed.
- More easily document employee skills, training needs and performance criteria.
- Improve consumer satisfaction and confidence through better developed evaluation skills for customer contact personnel.
- Improve employee satisfaction and morale by clarifying expectations.
- Improve quality, productivity, time-to-market and competitiveness.
- Achieve business goals.
- Partner with education and labor in developing school-to-work initiatives.

How Skill Standards Benefit Educators

Educators can identify core competencies and assessments based on the skill standards and implement them in their curricula. Students can then be required to demonstrate competency throughout their coursework. Academia and industry can build a cohesive relationship through a like-minded expectation of student competencies and work readiness. This enhances an instructor's ability to teach information consistent with industry's entry level expectations and needs. In addition, educators use skill standards to:

- Partner with business and labor in developing school-to-work initiatives.
- Provide effective, targeted instruction.
- Develop benchmarks for certificates of competence earned by students.
- Communicate what companies expect of employees.
- Develop new and evaluate existing curriculum and programs based on industry needs.
- Develop assessments to evaluate skills, knowledge, and abilities in classrooms and internships.
- Develop a common language on workforce preparation with business and labor.
- Improve relationships with local businesses, labor unions, other educators and agencies.
- Provide students with relevant career education and counseling.

How Skill Standards Benefit Labor Unions

Labor unions can use skill standards to gain support for company-sponsored worker training programs and to identify career paths for workers within companies and industries. Unions can provide this information to union members and develop strategies to improve career mobility and stability. Skill standards help unions to:

- Improve member value to the company.
- Provide a greater worker voice in the company.
- Link skill standards to increased training and upward career mobility for union members.
- Assist employers to match employee skills to the work needed.
- Develop skills-based training and certification initiatives that complement union apprenticeship programs.
- Communicate effectively with employers about worker training and retraining needs.
- Cooperate with education and industry in developing school-to-work initiatives.

How Skill Standards Benefit Students and Workers

Skill standards assist students in making career choices by providing industry expectations for success in the workplace. In addition, standards-based curriculum and assessments provide students with credentials that certify work-readiness. Work-ready students can anticipate being hired at higher rates of pay and can experience faster advancement in their chosen fields. Workers can accurately assess their skills against those required for career advancement and plan effectively for their career pathways. They can determine the skills and abilities needed for advancement or transfer within industries, and determine the continuous learning and training they need to upgrade their skills. In addition, students and workers can use skill standards to:

- Achieve clarity regarding what they are expected to learn and how to prepare for work.
- Enter and reenter the workforce with better control of their choices of high paying

- jobs requiring high skills.
- Accurately assess business expectations of the skills needed for positions and careers of their choice.
 - Improve mobility and portability of their credentials.
 - Obtain certification of competence of the skills they gain through experience, school, training, or self-study.
 - Enhance their performance and achievement by self-evaluation against known standards.
 - Be active contributors to the activities that make their organizations successful.

How Skill Standards Benefit Government

Government can provide information that will ensure a better skill match between workers and employers and initiate education reform to better educate future members of the workforce. Skill standards better enable agencies to provide options for career and job mobility and link learning to the needs of the workplace. In addition, government can use skill standards to:

- Assist in the development of a highly skilled and competitive workforce.
- Evaluate the effectiveness of publicly funded education and training.
- Increase opportunities for under-represented populations by making public the information that defines the skills required for success and by facilitating the national adoption of those definitions and their use.
- Support the creation of high performance organizations where they improve living standards for all members of the population.
- Facilitate collaboration between educators and industry.
- Communicate the need and basis for education reform to business, education, labor, and the community-at-large on both local and national levels.

Skill Standards to Curriculum: A Continuous Development Process

The skill standards generated in this project are designed to be used by participating education partners to develop or modify curriculum at the high school and community college level. By providing the necessary input from industry, this skill standards document is a first step in curriculum development to serve the power generation industry in particular, and to demonstrate what can be done across industries.

In order to keep current with a rapidly changing workplace, standards need to be reevaluated and updated on a regular basis, with full partner participation at each step. New technological developments impact the ways that workers organize and apply their skills, including time management and interpersonal relationships. Increased technological complexity may simplify some of the job tasks but make others more intricate. Today's successful power generation workers are challenged to acquire a broader range of decision making and customer service skills as well as keep current with emerging technologies. Ongoing changes like these must be reflected in curriculum in order to meet the needs of industry, where expectations for workers are evolving.

A model of continuous improvement for economic development: Using Skill Standards

Step 1: Skill Standards Identification

- Compile and research existing standards in related jobs and careers.
- Conduct focus groups to identify critical work functions and key activities, define key activity performance indicators and identify technical knowledge, foundation skills and personal qualities.
- Conduct a survey of current workers to determine level of SCANS skills required for each job.
- Develop work-related scenarios to place the skill standards in the context of the work environment.
- Verify the data gathered from focus groups.
- Disseminate skill standards information to involved parties from industry, education and labor for their review and editing.

Step 2: Assessment

- Develop assessments through the collaboration of industry and education to reflect competent performance as defined by the skill standards.
- Collect evidence of a person's ability to perform at the levels determined by the skill standards.
- Determine present skill level through direct and indirect evidence by assessing a student, trainee, apprentice, prospective worker or worker seeking additional training.
- Use products and items produced by the person being assessed as direct evidence.
- Gather supporting information to use as indirect evidence.
- Assess results using the criteria of validity, currency, authenticity and sufficiency.
- Demonstrate validity using tangible item or record of action.

- Demonstrate authenticity by having the individual being assessed produce the item or specific piece of a team-effort.
- Demonstrate sufficiency by providing enough evidence to match key tasks and performance criteria of the skill standards.

Step 3: Curriculum Development

- Identify necessary competencies based on the skill standards information and assessments.
- Develop program outcomes for specific academic and training programs, including Tech Prep, 2-year, and apprenticeship programs.
- Perform gap analysis to determine changes or additions to be made to curriculum.
- Revise existing curriculum to better meet the current and future needs of the industry.
- Develop new curriculum and establish new programs based on these competencies.

Step 4: Articulation

- Develop models to support the articulation of program outcomes and competencies between academic and training systems.
- Establish articulation agreements between existing programs to ensure portability of skills.
- Connect competencies and Certificates of Competence with benchmark documentation to build national portability systems.

A Continuous Updating Process

A continuous exercise is necessary: all partners must revise and verify skill standards on a regular basis. For national economic development success, curriculum and current training methods must be updated to meet workplace standards.

Individual workers must have access to clearly stated competency goals and direct access to skill development assistance. With cooperative effort on local and national levels, we can begin to resolve the workforce shortages in the power generation industry that face us today.

Pyramid of Competencies

The Pyramid of competencies is a depiction of skill standards in three broad skill categories.

Tier I

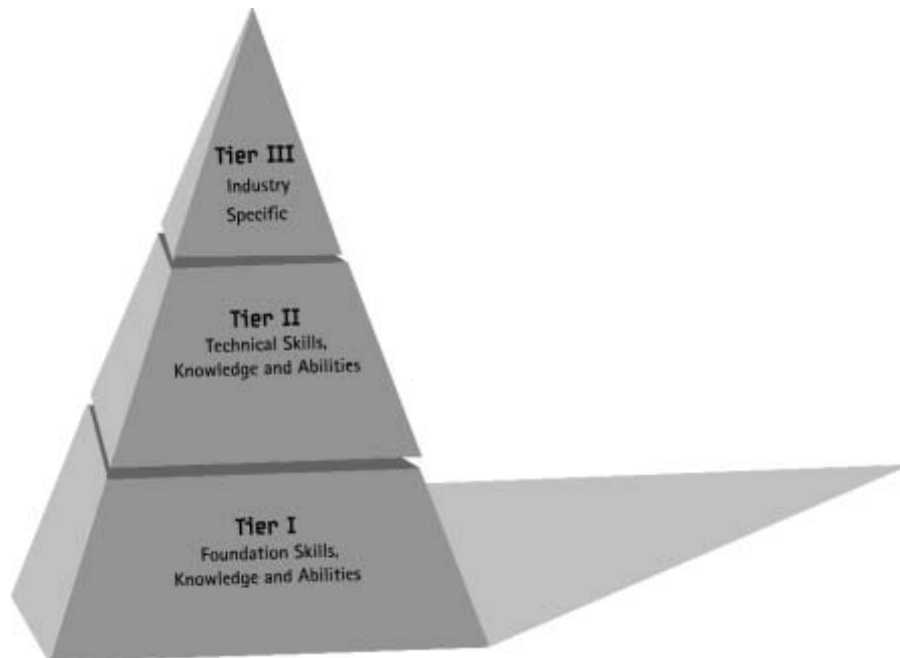
Tier I represents the broadest level of competencies, and is the set of employability (SCANS) skills, knowledge, abilities and personal qualities required of all workers to be successful in today's workplace. These are the universal skills that are needed to apply technical knowledge and tools effectively.

Tier II

Tier II represents technical skills, knowledge and abilities common to a cluster of jobs within a cluster across all an industries or industry sectors. For workers in power generation, for example, knowledge of applicable federal, state and local laws would be applicable across all sectors.

Tier III

Tier III represents industry-specific technical skills, knowledge and abilities that are unique to individual jobs or clusters and are the most prone to rapid change. For example, many workers need to upgrade their skills based on sudden market shifts.



COMBUSTION TURBINE SKILL STANDARDS PROJECT

Project Goals, Guiding Principals and Methodology

Employability Skills: SCANS Profile

Definition of Terms

Project Goals, Guiding Principle and Methodology

Goals

- Identify voluntary skill standards for Combustion Turbine Specialists as part of the power generation industry. The standards will serve as benchmarks for entry into power generation careers at the technical level.
- Disseminate the results and support the use of skill standards by educators, businesses, unions, students, workers and government agencies.

Guiding Principles

- Experienced workers are the experts in their career field and are best able to identify the work performed and the skills, knowledge and abilities required to be successful.
- Business, labor and education must work as partners to ensure the creation of a link between the work expectations and the curriculum.
- The standards must be consistent with existing civil rights laws and practices.
- Standards must be flexible, portable and should be updated continuously.
- Skill standards describe the major functions and key activities, as well as the performance indicators, technical knowledge and skills, employability skills and personal attributes needed to succeed in the workplace.
- Integrated skill standards define work duties and the skills required to perform them in the context of work settings.

The experience of the partners involved in this project holds that the success of any skill standards project is critically linked to the full participation and commitment of all partners.

Identification of Skill Standards: Methodology

Background

These industry-defined skill standards were developed using specific research-based processes. The project followed the process required by the Washington State Board for

Community and Technical Colleges (SBCTC) as described in *Skill Standards Guidebook I*, Washington State Board for Community and Technical Colleges, (1996) and the process developed by the National Skill Standards Board (NSSB). In particular, the protocols used for the ICT (Information Communications Technology) skill standards were applied to this project.

The Center of Excellence for Energy was formed in 2003 in response to the desire of industry to address the ever-widening shortfall of skilled workers in the power generation industry. The Center represents the education and training needs of the Energy industry through its partnership with employers, labor and educators. In 2006, funds were granted this project by the Washington State Workforce Training and Education Coordinating Board to conduct a skill standard study.

Dr. Alan Hardcastle of the WSU Extension Energy Program and Terryll Bailey of The Allison Group, conducted extensive secondary research to identify trends, current jobs and existing skill standards in the power generation sector including data from the SBCTC Skill Standards Web site and the NSSB. Researchers met with industry representatives to determine the goals and research design of the skill standards project, to obtain their input on the research to date and to finalize the clusters to be covered in the study.

A focus group session was conducted with Senior Experts from industry to review the preliminary research and advise the research process. These employers and labor leaders established the project direction and timeline, and identified an initial list of critical work functions and key activities. This initial list was subsequently reviewed by panels of subject matter experts; primarily current workers who perform those jobs.

Focus Groups

In the focus group, a structured process was used to guide the panel through the development of the critical work functions and key activities. The process included the following elements.

- Panelists were facilitated by a professional skill standards focus group leader.
- Panelists receive an orientation to skill standards. Examples were provided.
- Panelists from diverse areas of the power generation industry arrived at consensus regarding the components of the skill standards.
- Panelists clarified the organization and structure of the critical work functions and key activities, filled in gaps, and confirmed the accuracy of the critical work functions and key activities.
- Panelists identified Performance Indicators for each key activity.

- Panelists identified occupational technical knowledge and skills for each key activity.
- Panelists brainstormed the topics that need to be covered in training and education programs to prepare people to enter the work.
- Panelists completed survey to level SCANS.

After a thorough orientation to skill standards, panelists were asked to brainstorm critical work functions for their cluster. After composing their own critical work functions, they were then provided with the draft critical work functions identified by the Senior Experts and through research. Panelists were asked to compare the critical work functions from the Senior Experts with those they brainstormed as a group and to consider the following criteria:

- Is the function a broad responsibility?
- Does it take a significant amount of time to achieve?
- Are there groupings of Key Activities associated with it?

Participants were asked to review the key activities for each critical work function and to posit appropriate changes wherever necessary. The criteria used for this purpose were:

- Does the activity describe what you have to do to achieve this function?
- Is it a major area of task responsibility?
- Is it concrete and specific?
- Does it have relatively equal importance to the other Key Activities?
- Does each Key Activity require distinct, definable skills?

Once the critical work functions and key activities were finalized, performance indicators were developed for each key activity. Panelists were asked how they know when a task is performed well and what elements need to be in place so they would be ensured that this key activity is performed competently. The following criteria were provided regarding performance indicators:

Performance Indicators should...

- Describe competent performances.
- Be directly observable, concrete and measurable.
- Capture the essential aspects of performance.
- Be as precise and explicit as possible but still apply across the industry cluster.
- Reflect what the individual can control.

Panelists brainstormed performance indicators and then arrived at consensus with respect to the final list. The group was assisted in putting the content into appropriate language format.

Panelists next moved to identify the occupational technical knowledge and skills for each key activity. They brainstormed occupational technical knowledge and skills, and then arrived at the final list through consensus. Panelists were asked what a person needs to know and be able to do to accomplish the key activities at the level defined by the performance indicators.

In each focus group an informal discussion was held to identify the subjects and topics most important for new entrants to the industry.

Surveys

A survey was conducted to level SCANS skills and personal qualities for the cluster. SCANS (Secretary's Commission on Achieving Necessary skills) are foundation abilities required of workers in all occupations at varying levels specific to their jobs, ranging from basic academic skills to problem solving, working in teams and the use of technology. Surveys were distributed to panelists in the focus groups and to workers across the State of Washington. Complete survey data from 25 Combustion Turbine Specialists was collected and analyzed. The SCANS survey results are presented on pages 50 and 51.

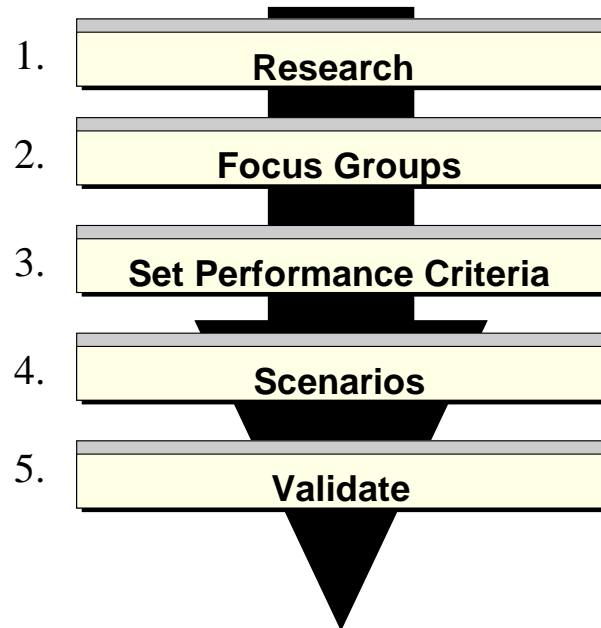
Senior Expert Review

Senior Experts from the energy generation sector reviewed the critical work functions, key activities and performance indicators produced by the focus group panels. The Senior Experts provided a few minor edits and answered some follow up questions from the research team. All of the Senior Experts confirmed the content of the skill standards.

Industry-wide Review

The preliminary CT skill standard was reviewed and verified in the early part of 2009 by a survey of the energy industry. Survey respondents were asked to comment on the standards, and to rank the relative importance of the functions and tasks identified by the focus groups. Complete survey data from 24 CT specialists and subject matter experts was collected and analyzed. The Verification Survey Results are presented on page 58.

Process: Building Skill Standards



Employability Skills: SCANS Profile

During the data-gathering process of this project, employability skills for power generation careers were identified. Employability, or workplace skills, are basic academic and foundation skills needed to build more advanced competencies. The foundation skills are based on broad workplace categories, known as SCANS (Secretary’s Commission on Achieving Necessary Skills, U.S. Department of Labor). This federal report issued in 1991 identifies 37 foundation and workplace competencies required for work readiness.

SCANS are comprised of a three-part foundation of skills and personal qualities and five workplace competencies needed for successful job performance in today’s workforce. Professionals currently working in the field were asked to identify the level of difficulty for each of the 37 SCANS skills most required for successful workplace performance in each cluster. The information in the charts on the following pages was compiled by taking a weighted average of the responses across the cluster. This summary information provides a general view of the key workplace skills deemed relevant and necessary for the front line worker in power generation as well as providing the foundation for the employability skills within the skill standards.

<i>Basic skills Competencies</i>	<i>Thinking skills</i>	<i>Personal qualities</i>	<i>Workplace</i>
Reading	Creative Thinking	Responsibility	Utilizing Resources
Writing	Decision Making	Self-worth	Interpersonal Skills
Arithmetic	Problem Solving	Sociability	Utilizing Information
Listening	Visualization	Self-management	Using Systems
Speaking	Knows/Learns Reasoning	Integrity/Honesty	Using Technology

The ADVANCE™ *Workplace Standards Skill Inventory* from Advanced Educational Spectrums, Inc. was used to capture industry views on foundation skills for power generation workers. Industry professionals ranked the SCANS skill levels required. The chart on the following pages contains information created by taking the average of the profiles across the clusters. This summary information provides a general view of the key foundation skills deemed relevant and necessary for the entry-level power generation worker.

<i>Applies creative thinking</i>	Level I <input type="checkbox"/> • Makes connections between old & new • Recognizes general relationships	Level II <input type="checkbox"/> • Paraphrases/summarizes generalizing existing ideas • Reconstructs creative thinking process while problem solving • Utilizes brainstorming techniques	Level III <input checked="" type="checkbox"/> • Develops creative solutions • Applies creative solutions to new situations	Level IV <input type="checkbox"/> • Generates unique solutions • Formulates new ideas/plans/approaches • Originates new processes/procedures	Level V <input type="checkbox"/> • Judges/validates creative responses • Actively pursues creative responses
<i>Applies decision making strategies</i>	Level I <input type="checkbox"/> • Understands decision making process • Recalls basic rules/principles • Identifies goals and constraints	Level II <input type="checkbox"/> • Applies rules/principles to situation • Gathers information	Level III <input checked="" type="checkbox"/> • Analyzes situation/information • Considers risks/implications • Considers multiple viewpoints	Level IV <input type="checkbox"/> • Generates alternative solutions • Evaluates alternative solutions • Formulates plan of action	Level V <input type="checkbox"/> • Judges consequences • Justifies proposed results • Sets decision making parameters
<i>Recognizes and solves problems</i>	Level I <input type="checkbox"/> • Identifies the problem	Level II <input type="checkbox"/> • Understands the complaint/disciplinary • Appropriately enters complaint/disciplinary	Level III <input checked="" type="checkbox"/> • Examines informational data • Considers risks/implications • Considers multiple viewpoints	Level IV <input type="checkbox"/> • Generates/evaluates solutions • Designs/implements plan of action	Level V <input type="checkbox"/> • Evaluates/adjusts plan of action

Sample survey questions from the Advance Workplace Standards Skill Inventory

Definition of terms

Each chart in the following skill standards templates contains the following components:

Clusters

Clusters describe the major areas of work carried out across an industry cluster. They apply across specific industry segments (e.g. automobile manufacturing, furniture manufacturing, airplane manufacturing, etc.) and often cover families of related job titles. Plant electricians are an example of a cluster within power generation.

Critical Work Functions

Critical work functions represent the general areas of responsibility for the front-line worker in power generation. The functions tell us what must be done to achieve the key purpose of an occupation cluster.

Employability Skills

Employability skills are basic academic and personal skills that are needed to build more advance competencies. They are competencies required by all workers in order to obtain meaningful work and participate in the modern workforce.

Key Activities

Key activities are the tasks related to the functional area of the career cluster and performed by workers in a given occupation. They are made up of work activities which are measurable and observable, and which result in a decision, product or service.

Level of Importance

Professionals who are actively working in this occupation rated the level of importance for each critical work function and key activity, ranging from not important to critical. All critical work functions were rated and verified as being important, very important or critical.

Performance Indicators

Performance indicators are specific behavioral evidence of a worker's achievement of skills, knowledge and task completion. The question answered is: "How do we know when this key activity is performed well?" Performance indicators provide the standard of performance required to produce the necessary outcomes of key activities.

Technical Skills, Knowledge, Abilities and Tools

Technical skills, knowledge and abilities are those areas of expertise which workers must have in order to perform a given occupational task with excellence. A collection of skills, knowledge, abilities and tools make up competencies.

Skills refer to proficiency in an applied activity. This activity could be physical, mental or interpersonal in nature.

Knowledge is a particular set of information.

Abilities are broad human characteristics that result from natural talent, training or experience.

Tools are materials, equipment and implements a worker must be able to use competently to meet the requirements of the job.

RESULTS: Skill Standards for Combustion Turbine Technician

Typical Job Description

Scenarios: Routine, Crisis and Long Term

SCANS Survey Results

Summary of Critical Work Functions and Key Activities

Theories and Concepts

Verification Survey Results

Skill Standards

Typical Job Description

Combustion Turbine Technician/Specialist

Job Description:

PRIMARY PURPOSE:

Perform skilled journey-level work in the construction, installation, inspection, operation and maintenance of generation plant electrical and mechanical equipment as it applies to combustion turbines, internal combustion engines, steam and/or combined cycle generation facilities.

RESPONSIBILITIES/ ACCOUTABILITIES:

May be responsible to perform a combination of the following duties based upon job assignment:

- Monitoring and operating plant equipment.
- Take and record all necessary equipment and instrumentation readings and data.
- Manually and remotely operating valves and equipment.
- Responsible for performing predictive, preventive and corrective maintenance.
- Repair, recondition and overhaul large turbines and generators.
- Drive and operate equipment.
- Work safely and cooperatively with co-workers.
- Perform all work in compliance with applicable codes, standards, safety and environmental regulations.
- Other related incidental work as needed.
- Respond to plant upset events and emergencies.
- Plan and direct the activities of others as assigned.
- Responsible for time reporting and other reports as required.

GENERAL QUALIFICATIONS

Skills/ Competencies:

- Proficient in using the tools and equipment of the trade as related to combustion turbine work.
- Working knowledge of operational, mechanical and electrical fundamentals as pertains to utility systems.
- Competent organizational skills and the ability to communicate effectively.
- Attend training sessions and successfully complete formal training as furnished by company.
- Applicable laws, codes, regulations, policies and procedures.
- Basic First Aid procedures.
- Analyze situations accurately and adopt an effective course of action.

Degrees/ Certificates/ License/ Experience:

Required:

- Completed a recognized combustion turbine apprenticeship program or its equivalent.
- Obtain and maintain a First Aid, CPR and AED Certification.
- Possession and maintenance of valid Commercial Driver's license (CDL A) and lift truck certification.

PHYSICAL REQUIREMENTS/WORKING CONDITIONS:

- Requires climbing, standing, bending and lifting heavy objects in awkward and confined spaces using proper lifting and rigging techniques.
- Subject to exposure to fumes, dust and high levels of vibration.
- Subject to exposure to high noise levels required ear protection
- Subject to working at heights and in adverse weather conditions.
- Work includes indoor and outdoor environment.
- May be subject to after duty call-outs

Scenarios: Routine, Crisis and Long Term

Routine Scenario:

A routine shift for a CT Technician would consist of a number of daily checks and tasks to insure that the plant is operating within normal parameters or maintained in a ready state for start-up. The shift crew would typically consist of two to three operators / technicians, with one as the lead operator / tech. Examples of titles would include Control Room Operator, Outside Operator, Plant Equipment Operator, Auxiliary Operator, Tech III, Tech II, and Tech I.

The start of every shift begins with a shift turnover covering all important information to pass on to the new crew about the status of the plant equipment. A good turnover is very important; to insure the new crew understands current equipment status and all the problems that have happened since their last time on shift.

After taking the shift, the first routine is to take a look at all running equipment from the Digital Control System (DCS) by the Lead Operator. Alarms would be acknowledged and corrective actions taken as needed. Any requested load/var changes would be preformed in a timely manner.

The other operator/tech would do a quick tour of the plant, looking for major problems. Later, a more detailed tour will be completed to take local readings, change soaked oil pads, empty garbage cans and clean up. Any new problems would be identified and work orders written.

Chemistry would be monitored by the lead operator with on-line instruments and by the Outside operator/tech with grab/lab samples, to insure values are in spec. Bad Chemistry (values outside of spec) can do major damage to the boiler, steam turbine and cooling tower fill in a short amount of time, costing thousands of dollars to repair. It is common to make small changes in chemical feed rates daily, to keep chemistry in spec.

Common checks and tests are called routines. Typical routines are done over a standard time, i.e. per shift, daily, weekly, and monthly. Examples of routines would be valve tests (moving steam turbine control valves and non-return valves to insure they are not stuck), and pump tests (to insure emergency and back-up pumps start). Some routine checks would include topping off equipment oil levels, filling make-up tanks, blowing down in-line strainers, and changing out empty calibration gas bottles.

At the end of a routine shift the off-going shift prepares for the shift turn over by taking a last look at the equipment and making sure the kitchen is clean.

Primary Tasks and Functions Involved in this Scenario

Critical Work Functions	Key Activities								
A. Operate and Monitor Plant Equipment	<i>A1</i> <i>Inspect plant equipment</i>	<i>A2</i> <i>Operate equipment</i>	<i>A3</i> <i>Identify problems or potential problems and take corrective actions (troubleshooting)</i>	<i>A4</i> <i>Ensure equipment is operating within operational and environmental parameters</i>	<i>A5</i> <i>Perform logging and record-keeping</i>	<i>A6</i> <i>Monitor & analyze equipment performance</i>	<i>A7</i> <i>Respond to equipment emergencies, malfunctions and alarms</i>	<i>A8</i> <i>Train others to understand plant systems and use equipment</i>	<i>A9</i> <i>Perform housekeeping</i>
B. Maintain and Repair Plant Systems & Equipment	<i>B1</i> <i>Perform troubleshooting</i>	<i>B2</i> <i>Perform preventive & corrective maintenance</i>	<i>B3</i> <i>Gather materials, tools and equipment</i>	<i>B4</i> <i>Perform repairs</i>	<i>B5</i> <i>Document maintenance and repair of plant systems & equipment</i>	<i>B6</i> <i>Perform housekeeping</i>	<i>B7</i> <i>Fabricate parts, pieces and systems, specialty devices & tools</i>	<i>B8</i> <i>Install & test equipment</i>	<i>B9</i> <i>Perform logging and record-keeping</i>
C. Operate Plant Support Equipment (i.e.) forklifts, cranes, etc.	<i>C1</i> <i>Inspect equipment</i>	<i>C2</i> <i>Monitor equipment indicators to ensure it is operating correctly</i>	<i>C3</i> <i>Operate rolling / mobile equipment</i>	<i>C4</i> <i>Operate heavy lifting equipment</i>					
D. Promote Reliability and Productivity	<i>D1</i> <i>Prepare shift logs</i>	<i>D2</i> <i>Participate in meetings and problem solving groups</i>	<i>D3</i> <i>Communicate job-specific needs to supervisors and coworkers</i>	<i>D4</i> <i>Develop & review work practices & procedures</i>	<i>D5</i> <i>Participate in the management of change process</i>	<i>D6</i> <i>Monitor plant systems for efficiency</i>			

Critical Work Functions	Key Activities								
E. Maintain a Safe Work Environment	<i>E1 Conduct safety inspections</i>	<i>E2 Perform emergency drills and participate in emergency response teams</i>	<i>E3 Identify and report unsafe conditions and take corrective action</i>	<i>E4 Lead or participate in safety meetings</i>	<i>E5 Offload chemicals</i>	<i>E6 Perform job safety analysis / tailgate</i>			
F. Ensure Regulatory Compliance	<i>F1 Perform compliance activities</i>	<i>F2 Maintain water discharge water quality</i>	<i>F3 Maintain air quality</i>						
G. Perform Administrative Functions	<i>G1. Maintain professional skills</i>	<i>G2 Perform as Lead as assigned</i>	<i>G3 Place orders and maintain inventory</i>	<i>G4 Write reports as assigned</i>					

Crisis Scenario:

Combustion Turbine Operators/Technicians have to be prepared to handle the non-routine events that happen during their shift. They sometimes have to make split second decisions, based on the information they have.

Alarms alert the operator/technician of abnormal conditions. When an alarm is received, it's the operator's duty to respond in a timely manner that will correct the abnormal condition, but in a way that has the least stress to the plant equipment. Sometimes parameters go beyond allowable limits faster than an operator can react, resulting in a trip. A trip will automatically shut-down equipment to place it in a safe condition. When the combustion turbine and steam turbine both trip off-line, it is referred to as a plant trip. Plant trips can cost thousands of dollars in replacement power and equipment repair. It is very important for the CT Operator to do all they can to prevent unnecessary trips.

The CT operator/technician also has to be ready to handle other emergencies with no warning, like fires, bomb threats, spills, and accidents.

It takes years of study and experience for an operator/technician to learn all the plant systems and actions required in a crisis situation.

Primary Tasks and Functions Involved in this Scenario

Critical Work Functions	Key Activities								
A. Operate and Monitor Plant Equipment	A1 <i>Inspect plant equipment</i>	A2 <i>Operate equipment</i>	A3 <i>Identify problems or potential problems and take corrective actions (trouble-shooting)</i>	A4 <i>Ensure equipment is operating within operational and environmental parameters</i>	A5 <i>Perform logging and record-keeping</i>	A6 <i>Monitor & analyze equipment performance</i>	A7 <i>Respond to equipment emergencies, malfunctions and alarms</i>	A8 <i>Train others to understand plant systems and use equipment</i>	A9 <i>Perform housekeeping</i>
B. Maintain and Repair Plant Systems & Equipment	B1 <i>Perform troubleshooting</i>	B2 <i>Perform preventive & corrective maintenance</i>	B3 <i>Gather materials, tools and equipment</i>	B4 <i>Perform repairs</i>	B5 <i>Document maintenance and repair of plant systems & equipment</i>	B6 <i>Perform housekeeping</i>	B7 <i>Fabricate parts, pieces and systems, specialty devices & tools</i>	B8 <i>Install & test equipment</i>	B9 <i>Perform logging and record-keeping</i>
C. Operate Plant Support Equipment (i.e.) forklifts, cranes, etc.	C1 <i>Inspect equipment</i>	C2 <i>Monitor equipment indicators to ensure it is operating correctly</i>	C3 <i>Operate rolling / mobile equipment</i>	C4 <i>Operate heavy lifting equipment</i>					
D. Promote Reliability and Productivity	D1 <i>Prepare shift logs</i>	D2 <i>Participate in meetings and problem solving groups</i>	D3 <i>Communicate job-specific needs to supervisors and coworkers</i>	D4 <i>Develop & review work practices & procedures</i>	D5 <i>Participate in the management of change process</i>	D6 <i>Monitor plant systems for efficiency</i>			

Critical Work Functions	Key Activities									
E. Maintain a Safe Work Environment	<i>E1 Conduct safety inspections</i>	<i>E2 Perform emergency drills and participate in emergency response teams</i>	<i>E3 Identify and report unsafe conditions and take corrective action</i>	<i>E4 Lead or participate in safety meetings</i>	<i>E5 Offload chemicals</i>	<i>E6 Perform job safety analysis / tailgate</i>				
F. Ensure Regulatory Compliance	<i>F1 Perform compliance activities</i>	<i>F2 Maintain water discharge water quality</i>	<i>F3 Maintain air quality</i>							
G. Perform Administrative Functions	<i>G1. Maintain professional skills</i>	<i>G2 Perform as Lead as assigned</i>	<i>G3 Place orders and maintain inventory</i>	<i>G4 Write reports as assigned</i>						

Long Term Scenario:

The newer and bigger gas turbines are adversely affected by the large thermal cycle of a plant trip, making it all the more important for the CT Operator/Technician to have extensive training and knowledge. Some CT Operator/Techs are sent to a simulator to hone their operating skills or to a Gas Turbine Users Group Meeting.

At many of the Combustion Turbine Plants the Techs also have maintenance duties. It is common for the Techs to be sent to off-site training annually in areas like DCS Controls, Chemistry, Pumps, Motors, Valves, and Hydraulics. Other duties can include purchasing tools and parts, warehouse inventory and completing PM's . Some Techs might be trained in safety inspections and fire fighting.

Good oral and writing skills are a must. Most of the plant procedures are written by the operators. Many reports are required to record the data that must be reported to company officers and state regulators. Skills in Word and Excel are used in creating the procedures and reports. Learning a maintenance management system like Maximo is also desired.

Most Techs have extra responsibilities like keeping the Hazardous Waste Log and MSDS's updated, serving on the safety committee, or filling out the state fire marshal report.

Primary Tasks and Functions Involved in this Scenario

Critical Work Functions	Key Activities								
A. Operate and Monitor Plant Equipment	A1 <i>Inspect plant equipment</i>	A2 <i>Operate equipment</i>	A3 <i>Identify problems or potential problems and take corrective actions (troubleshooting)</i>	A4 <i>Ensure equipment is operating within operational and environmental parameters</i>	A5 <i>Perform logging and record-keeping</i>	A6 <i>Monitor & analyze equipment performance</i>	A7 <i>Respond to equipment emergencies, malfunctions and alarms</i>	A8 <i>Train others to understand plant systems and use equipment</i>	A9 <i>Perform housekeeping</i>
B. Maintain and Repair Plant Systems & Equipment	B1 <i>Perform troubleshooting</i>	B2 <i>Perform preventive & corrective maintenance</i>	B3 <i>Gather materials, tools and equipment</i>	B4 <i>Perform repairs</i>	B5 <i>Document maintenance and repair of plant systems & equipment</i>	B6 <i>Perform housekeeping</i>	B7 <i>Fabricate parts, pieces and systems, specialty devices & tools</i>	B8 <i>Install & test equipment</i>	B9 <i>Perform logging and record-keeping</i>
C. Operate Plant Support Equipment (i.e.) forklifts, cranes, etc.	C1 <i>Inspect equipment</i>	C2 <i>Monitor equipment indicators to ensure it is operating correctly</i>	C3 <i>Operate rolling / mobile equipment</i>	C4 <i>Operate heavy lifting equipment</i>					
D. Promote Reliability and Productivity	D1 <i>Prepare shift logs</i>	D2 <i>Participate in meetings and problem solving groups</i>	D3 <i>Communicate job-specific needs to supervisors and coworkers</i>	D4 <i>Develop & review work practices & procedures</i>	D5 <i>Participate in the management of change process</i>	D6 <i>Monitor plant systems for efficiency</i>			

Critical Work Functions	Key Activities								
E. Maintain a Safe Work Environment	<i>E1 Conduct safety inspections</i>	<i>E2 Perform emergency drills and participate in emergency response teams</i>	<i>E3 Identify and report unsafe conditions and take corrective action</i>	<i>E4 Lead or participate in safety meetings</i>	<i>E5 Offload chemicals</i>	<i>E6 Perform job safety analysis / tailgate</i>			
F. Ensure Regulatory Compliance	<i>F1 Perform compliance activities</i>	<i>F2 Maintain water discharge water quality</i>	<i>F3 Maintain air quality</i>						
G. Perform Administrative Functions	<i>G1. Maintain professional skills</i>	<i>G2 Perform as Lead as assigned</i>	<i>G3 Place orders and maintain inventory</i>	<i>G4 Write reports as assigned</i>					

SCANS Survey Results: Combustion Turbine Technician/Specialist

Foundation Skills and Personal Qualities	0	1	2	3	4	5	Critical Competencies
Basic Skills							
Demonstrates Effective Reading Strategies							<i>Identifies relevant details, facts, specifications, follows set of instructions and qualifies/analyzes information.</i>
Demonstrates Effective Writing Strategies							<i>Records information accurately, creates original documents and summarizes information.</i>
Applies Arithmetic Processes							<i>Interprets and converts numerical data and predicts arithmetic results.</i>
Applies Mathematics Processes							<i>Uses mathematical processes and interprets mathematical data.</i>
Demonstrates Effective Listening Skills							Confirms information and interprets, clarifies and influences communication.
Demonstrates Effective Speaking Skills							<i>Communicates appropriate verbal/non-verbal messages, actively participates in discussion and presents complex ideas and information.</i>
Thinking Skills							
Applies Creative Thinking/Generates Ideas							<i>Demonstrates creative thinking process while problem solving; develops creative solutions and applies them to new situations.</i>
Applies Decision Making Strategies							Analyzes situations and information, considers risks and implications, and compiles multiple viewpoints.
Recognizes and Solves Problems							Analyzes possible causes, generates and evaluates solutions and generates and evaluates solutions.
Demonstrates Visualization							Utilizes previous training and experience to predict outcomes; visually analyzes relationship between parts/whole and process/procedure and interprets charts, graphs and symbols.
Knows How to Learn							Interprets and applies new knowledge and experience and analyzes application of learning tools.
Applies Reasoning Skills							Applies and analyzes rules and principles to processes and procedures and uses logic to draw conclusions.
Personal Qualities							
Demonstrates Responsibility							Pays attention to details, demonstrates initiative, monitors performance standards and follows up on assigned tasks.
Demonstrates Belief in Self Worth							Defends own viewpoints, accepts responsibility for own behavior and understands own impact on others.
Demonstrates Sociability in Groups							Establishes rapport with co-workers and customers; modifies behavior to environment; shows understanding for others and encourages cooperation and negotiation.
Demonstrates Self-Management							<i>Maintains self control, accepts constructive criticism, sets well defined/realistic goals and demonstrates commitment to self improvement.</i>
Demonstrates Integrity/Honesty							<i>Demonstrates honesty and trustworthiness, accepts responsibility for own behavior, analyzes implications of decisions and recommends ethical course of action.</i>

Foundation Skills and Personal Qualities	0	1	2	3	4	5	Critical Competencies
Management of Time/ Resources Manages Time							Efficiently manages time, prioritizes daily tasks, prepares schedule and monitors and adjusts task sequence.
Manages Money							Performs routine recordkeeping.
Manages Materials/Facilities							Orders and maintains inventory and monitors safe and efficient utilization of materials.
Manages Human Resources							<i>Recognizes job tasks, and distributes and analyzes work assignments.</i>
Management / Use of Information Acquires/Evaluates Information							<i>Selects data relevant to the task, predicts outcomes, analyzes data and integrates multiple items of data.</i>
Organizes/Maintains Information							<i>Interprets information, transfers information between formats and proposes new processes.</i>
Interprets/Communicates Information							Recognizes accuracy of information, interprets information and prepares basic summaries.
Uses Computers to Process Information							<i>Utilizes integrated software, utilizes networks and manipulates information.</i>
Interpersonal Skills Participates as Team Member							<i>Assists and encourages team members, actively participates, works to improve team skills and demonstrates commitment.</i>
Teaches Others							<i>Conducts task-specific training, coaches others to apply related concepts and provides constructive feedback/reinforcement.</i>
Serves Customers							Demonstrates sensitivity to customer concerns and responds to and analyzes customer needs.
Exhibits Leadership							Adheres to standards, demonstrates commitment to excellence and leads by example.
Negotiates Agreements							<i>Understands negotiations process, identifies conflicts, demonstrates composure and interprets concerns.</i>
Works with Diversity							Recognizes differences, understands the legal aspects of discrimination, respects the rights of others recognizes the value of diversity.
Understand/Manage of Systems Understands System							Understands the system organization and hierarchy and follows processes and procedures.
Monitors/Corrects System Performance							<i>Monitors system performance, analyzes system operation, distinguishes trends in performance and diagnoses performance deviations.</i>
Improves/Designs Systems							<i>Determines system components to modify and improve; examines proposed modifications, improvements; analyzes goals and constraints.</i>
Use of Technology Selects Appropriate technology							<i>Understands technological requirements and results; analyzes task/technology relationship; proposes simple technological solutions.</i>
Applies Technology to Task							<i>Understands operation/interaction; manipulates technology for desired result; analyzes technology output; examines task/technology relationship.</i>
Maintains/Troubleshoots Tech							Troubleshoots and corrects malfunctions and failures; evaluates performance of technology; analyzes failures.

Skill Standards: Combustion Turbine Technician/Specialist

Energy Industry: Power Generation Skill Standards
Cluster: Combustion Turbine Plant Technician/Specialist

Critical Work Functions	Key Activities								
A. Operate and Monitor Plant Equipment	A1 <i>Inspect plant equipment</i>	A2 <i>Operate equipment</i>	A3 <i>Identify problems or potential problems and take corrective actions (trouble-shooting)</i>	A4 <i>Ensure equipment is operating within operational and environmental parameters</i>	A5 <i>Perform logging and record-keeping</i>	A6 <i>Monitor & analyze equipment performance</i>	A7 <i>Respond to equipment emergencies, malfunctions and alarms</i>	A8 <i>Train others to understand plant systems and use equipment</i>	A9 <i>Perform housekeeping</i>
B. Maintain and Repair Plant Systems & Equipment	B1 <i>Perform troubleshooting</i>	B2 <i>Perform preventive & corrective maintenance</i>	B3 <i>Gather materials, tools and equipment</i>	B4 <i>Perform repairs</i>	B5 <i>Document maintenance and repair of plant systems & equipment</i>	B6 <i>Perform housekeeping</i>	B7 <i>Fabricate parts, pieces and systems, specialty devices & tools</i>	B8 <i>Install & test equipment</i>	B9 <i>Perform logging and record-keeping</i>
C. Operate Plant Support Equipment (i.e.) forklifts, cranes, etc.	C1 <i>Inspect equipment</i>	C2 <i>Monitor equipment indicators to ensure it is operating correctly</i>	C3 <i>Operate rolling / mobile equipment</i>	C4 <i>Operate heavy lifting equipment</i>					
D. Promote Reliability and Productivity	D1 <i>Prepare shift logs</i>	D2 <i>Participate in meetings and problem solving groups</i>	D3 <i>Communicate job-specific needs to supervisors and coworkers</i>	D4 <i>Develop & review work practices & procedures</i>	D5 <i>Participate in the management of change process</i>	D6 <i>Monitor plant systems for efficiency</i>			

Critical Work Functions	Key Activities									
E. Maintain a Safe Work Environment	<i>E1 Conduct safety inspections</i>	<i>E2 Perform emergency drills and participate in emergency response teams</i>	<i>E3 Identify and report unsafe conditions and take corrective action</i>	<i>E4 Lead or participate in safety meetings</i>	<i>E5 Offload chemicals</i>	<i>E6 Perform job safety analysis / tailgate</i>				
F. Ensure Regulatory Compliance	<i>F1 Perform compliance activities</i>	<i>F2 Maintain water discharge water quality</i>	<i>F3 Maintain air quality</i>							
G. Perform Administrative Functions	<i>G1. Maintain professional skills</i>	<i>G2 Perform as Lead as assigned</i>	<i>G3 Place orders and maintain inventory</i>	<i>G4 Write reports as assigned</i>						

Cluster: Combustion Turbine Technician/Specialist

Knowledge of foundational science and engineering concepts and theories is essential in order to perform functions required of Combustion Turbine Plant Technicians/Specialists. These are listed below, and are important supplements to the technical knowledge and skills listed with each key activity.

SCIENCE AND ENGINEERING THEORIES AND CONCEPTS

- Behavior of matter
- Pressure and Chemistry of steam/water, boiler water, air and oil
- Gasses and liquids
- Mechanical energy
- Introductory mechanical engineering concepts
- Levers, pulleys, machines
- Hydraulics, pneumatics
- Applied physics and thermal dynamics
- Basic system design and components: hydraulics, pneumatics, terminology, symbols, functions, etc
- Water treatment and purification control systems
- Basic electricity
- Environmental stewardship; CEM (continuous emissions monitoring control system)
- Machines, friction and bearings
- Lubrication and cooling
- Cooling systems
- Overview of power generation delivery grid system from generation to end user
- WAC 296-45: High voltage electrical safety standards; OSHA 1910-333, NFPA 70-E
- Plant integrated operations
- Basic power plant fundamentals
- Combined cycle principles and concepts (i.e.) Rankine cycle, brayton, carnot
- Turbine design, construction and applications
- Steam tables
- HRSG (heat recovery steam generator)

MATH FOR COMBUSTION TURBINE TECHNICIAN/SPECIALIST

- Working knowledge of: measurement, layout, computation , formulae, functions (familiarity)
- Basic logic
- Algebra—working knowledge
- Solid geometry
- Computational technology
- Principles of alignment
- Torque
- Properties and behavior of motion
- Trigonometry (sin/cosine)

THERMAL CONCEPTS

- Number and type of systems
- Sources of fuel: quality, composition, chemistry
- Processing fuel
- Fuel storage
- Combined cycle steam plants
- Fuel supply logic
- Heat balance diagrams
- The industry is an interdependent system, not just individual companies operating autonomously; tied to a market system.

EQUIPMENT

- Gas turbine, steam turbine and associated support equipment
- Breakers (station service, air blast, vacuum, oil and field)
- Metal clad switchgear
- Electrical controls
- Generators
- Shop machinery
- Electrical hand tools
- Cranes
- Battery Chargers & inverters; Station and auxiliary battery banks
- Stator
- Rotors
- DC Exciters / solid state excitation
- Fractional horsepower motors
- AC and DC motors
- Annunciators / alarms
- Auxiliary Equipment (all non-turbine related—balance of plant)
- Station service transformers
- Distribution panels
- Transformers (current, potential, distribution)
- Auxiliary generating equipment & auxiliary generator controls
- Isolated phase busses
- Governors and governor controls
- Oil pump motors, starters and controls
- VFD variable frequency drive
- Turbine supervisory instrumentation
- Turbine fire suppression system
- Starting means
- Pumps
- Relays
- Neutral ground devices
- Switch boards, panels
- SF6 Breakers (high voltage breakers)
- Switching and grounding equipment
- Distribution circuits
- UPS power supplies
- Transfer switches

- Voltage regulators
- Motor starters and circuits
- Relay circuits
- Field rheostats
- PLCs and PLC programs (programmable logic controller)
- DCS (Distributive Control System)
- Emission control systems,
- Diesel generators
- Cathodic protection equipment
- Lightning arrestors
- Emergency lighting
- Motor operated valves (Linitorque/Crane Teledyne/Auma)
- LVDT (Linear Variable Differential Transformer) and proximity position sensing and indication
- Instrumentation systems and devices

PLANT ENVIRONMENT

- Outdoor lighting circuits
- Indoor lighting circuits
- Ventilation systems
- Conduits, wire, cable
- Overhead and underground wiring, including triplex
- Remote control circuitry
- RTU (remote termination unit)
- Security systems
- Heating and ventilation controls HVAC
- Emergency lighting
- Communication systems
- Life safety systems and equipment
- Air conditioners and heat pumps
- High voltage cables and terminations
- Cable trays
- Ground Fault Interrupters (GFI)
- Grounding and bonding systems
- Branch circuit panels and feeders and over current devices
- Power utilization circuits, devices and equipment

TOOLS, METERS AND MONITORING INSTRUMENTS

- Volt Ohm meter
- Ammeter
- Megger
- Phase rotation meter
- Capacitor tester
- Oscilloscope
- Instrumentation calibration tools
- Machine shop tools
- High voltage tester
- Hand tools

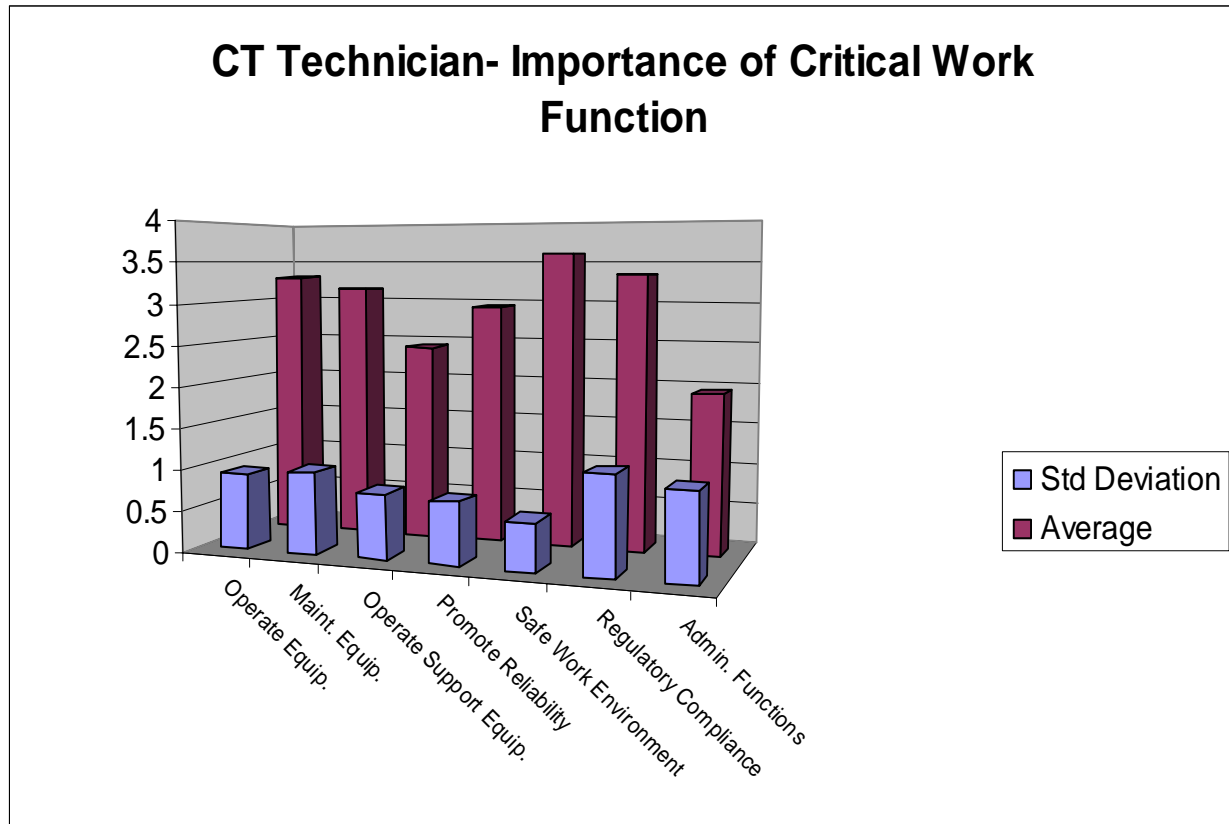
Benders, threaders,
Electric hand tools
Micro-Ohm Meter/ductor
Energized work tools
High pot tester
Insulation oil tester
Recording equipment/data acquisition equipment
Laser alignment equipment
Boroscope
Hot stick
Thermal imager
Hart communicator
Arc flash protection
Chemical lab equipment for water testing
Hot gloves
Hydrometer

Other: Knowledge of NEC, NESC, ANCI and IEEE or organizational construction electrical standards as required

Verification Survey Results

Verification surveys were administered to determine if the critical work functions and tasks identified by the Combustion turbine specialist's would be verified by a broader sample of CT technicians and subject-matter experts. Figure 1 shows the average importance and standard deviation of each function, rated on a scale from 0 to 4. These results generally verify that the critical work functions included in the skill standards document are relevant to the industry at large. The results show that Maintain a Safe Work Environment (Critical Work Function E) was rated highest as an important work function with the least amount of variation to the Combustion Turbine Technician, followed by Ensure Regulatory Compliance (Critical Work Function F), Operate and Monitor Plant Equipment (Critical Work Function A) and Maintain and Repair Plant Systems & Equipment (Critical Work Function B) with somewhat lower scores attributed to the remaining work functions. The largest variation in responses was Ensure Regulatory Compliance (Critical Work Function F), followed by Perform Administrative Functions (Critical Work Function G). These values, expressed as standard deviations, are just slightly above the average for all items.

Figure 1- Critical Work Function Average and Std. Deviation for CT Technician



Skill Standards

Cluster: Combustion Turbine Plant Technician/Specialist

Critical Work Function: A. Operate and Monitor Plant Equipment

KEY ACTIVITY	Performance Indicators How do we know when the task is performed well?	Technical Knowledge Skills, Abilities, Tools	Employability Skills SCANS Skills and Foundational Abilities
<p>A1. Inspect plant equipment</p>	<ul style="list-style-type: none"> • Sights, sounds, feel, smells and vibrations of equipment are thoroughly inspected. • Gauges and indicators are read and recorded, and fall within normal operating parameters • Equipment history and trend data are consulted when applicable. • Rounds are completed in a thorough manner. • Problems are reported or communicated and/or corrective action is taken after verification of problem. • Logs and status information systems are checked prior to inspections. • Inspection is thorough and conducted in a timely manner. • Equipment history and trend data are correctly analyzed history data are accurately compared. 	<ul style="list-style-type: none"> • Knowledge of the location of equipment in the plant, how the equipment operates and normal operating parameters. • Knowledge of plant technical drawings and symbols. • Knowledge of high voltage switching and substation components, and circuit breakers and disconnects. • Knowledge of safety standards and regulations and personal protective equipment and how to use it. • Knowledge of plant historian database program and the ability to analyze trend data. • Knowledge of standard operating procedures, ONOPS (Off Normal Operating Conditions), documentation requirements, and required logs. • Knowledge of industry, plant, company, equipment, scientific, technical, tool, safety, and personnel terminology. • Knowledge of how systems interrelate and the impact of this interrelationship on plant operations. 	<ul style="list-style-type: none"> • Selects data relevant to the task, predicts outcomes, analyzes data and integrates multiple items of data. • Efficiently manages time, prioritizes daily tasks, prepares schedule and monitors and adjusts task sequence. • Utilizes previous training and experience to predict outcomes; visually analyzes relationship between parts/whole and process/procedure and interprets charts, graphs and symbols. • Understands operation/interaction; manipulates technology for desired result; analyzes technology output; examines task/technology relationship. • Applies and analyzes rules and principles to processes and procedures and uses logic to draw conclusions. • Pays attention to details, demonstrates initiative, monitors performance standards and follows up on assigned tasks.

KEY ACTIVITY	Performance Indicators How do we know when the task is performed well?	Technical Knowledge Skills, Abilities, Tools	Employability Skills SCANS Skills and Foundational Abilities
A2. Operate equipment	<ul style="list-style-type: none"> • Plant operating procedures are properly followed such as pre-start, shut down, emergency or casualty response. • Appropriate tests are performed correctly, and test data is correctly analyzed. • Equipment is operated safely and efficiently • Equipment is correctly positioned, cross-tied and lined up for maintenance and other required conditions. 	<ul style="list-style-type: none"> • Knowledge of the location of equipment in the plant, how the equipment operates and normal operating parameters. • Knowledge of monitoring devices (such as meters, level indicators, temperature devices, flow indicators pressure indicators), how to read them and the ability to interpret readings. • Basic understanding of plant protective relays and metering and the ability to read and interpret relay targets. • Knowledge of PLCs (Programmable Logic Controller), DCS (Distributive Control System) and turbine control devices. • Knowledge of plant technical drawings and symbols. • Knowledge of high voltage switching and substation components, circuit breakers and disconnects and the procedures to obtain switching orders. • Knowledge of safety standards and regulations and personal protective equipment and how to use it. • Ability to use tools such as hand tools, power tools, meters. • Ability to use plant historian, read equipment histories and trend data, and record them. • Knowledge of standard operating procedures, ONOPS (Off Normal Operating Conditions), documentation requirements, and required logs. • Knowledge of industry, plant, company, equipment, scientific, technical, tool, safety, and personnel terminology. • Knowledge of how systems interrelate and the impact of this interrelationship on plant operations. 	<ul style="list-style-type: none"> • Interprets and applies new knowledge and experience and analyzes application of learning tools. • Utilizes previous training and experience to predict outcomes; visually analyzes relationship between parts/whole and process/procedure and interprets charts, graphs and symbols. • Analyzes situations and information, considers risks and implications, and compiles multiple viewpoints. • Identifies relevant details, facts, specifications, follows set of instructions and qualifies/analyzes information. • Applies and analyzes rules and principles to processes and procedures and uses logic to draw conclusions. • Pays attention to details, demonstrates initiative, monitors performance standards and follows up on assigned tasks. • Monitors system performance, analyzes system operation, distinguishes trends in performance and diagnoses performance deviations.

KEY ACTIVITY	Performance Indicators How do we know when the task is performed well?	Technical Knowledge Skills, Abilities, Tools	Employability Skills SCANS Skills and Foundational Abilities
<p>A3. Identify problems or potential problems and take corrective actions (trouble-shooting)</p>	<ul style="list-style-type: none"> • Equipment data is continuously assessed and problems are accurately identified. • Problems are correctly recognized and corrective actions are performed in a timely manner. • Criticality of problem is determined and proper actions are taken to guarantee safety of plant equipment and personnel. • Problem and solution are correctly documented. • Underlying root cause is identified and addressed where possible. • Problem and implications of problem are communicated with appropriate people in a timely manner. 	<ul style="list-style-type: none"> • Knowledge of the location of equipment in the plant, how the equipment operates and normal operating parameters. • Knowledge of monitoring devices (such as meters, level indicators, temperature devices, flow indicators pressure indicators), how to read them and the ability to interpret readings. • Ability to identify plant readings that are outside of normal operating parameters. • Basic understanding of plant protective relays and metering and the ability to read and interpret relay targets. • Knowledge of PLCs (Programmable Logic Controller), DCS (Distributive Control System) and turbine control devices. • Knowledge of plant technical drawings and symbols. • Knowledge of high voltage switching and substation components, and circuit breakers and disconnects. • Knowledge of safety standards and regulations and personal protective equipment and how to use it. • Ability to use tools such as hand tools, power tools, and meters. • Ability to use plant historian, read equipment histories and trend data, and record them. • Knowledge of corrective actions and responses for specific problems. • Knowledge of standard operating procedures, ONOPS (Off Normal Operating Conditions), documentation requirements, and required logs. • Knowledge of priorities and criticality of problems and root causes of problems. • Knowledge of industry, plant, company, equipment, scientific, technical, tool, safety, and personnel terminology. • Knowledge of common equipment malfunctions. • Knowledge of how systems interrelate and the impact of this interrelationship on plant operations. 	<ul style="list-style-type: none"> • Demonstrates creative thinking process while problem solving; develops creative solutions and applies them to new situations. • Applies and analyzes rules and principles to processes and procedures and uses logic to draw conclusions. • Understands operation/interaction; manipulates technology for desired result; analyzes technology output; examines task/technology relationship. • Determines system components to modify and improve; examines proposed modifications, improvements; analyzes goals and constraints. • Recognizes accuracy of information, interprets information and prepares basic summaries. • Analyzes possible causes, generates and evaluates solutions and generates and evaluates solutions.

KEY ACTIVITY	Performance Indicators How do we know when the task is performed well?	Technical Knowledge Skills, Abilities, Tools	Employability Skills SCANS Skills and Foundational Abilities
<p>A4. Ensure equipment is operating within operational and environmental parameters</p>	<ul style="list-style-type: none"> • Adjustments are made to prevent and/or alleviate deviations and maintain parameters • Adjustments, corrections, and equipment data are logged in accordance with company procedures. • Follow up is conducted to see how adjustments impact overall system. • Seasonal and climatic adjustments are correctly executed. • Compliance with environmental regulations is maintained. • Compliance with government agency regulations is maintained. 	<ul style="list-style-type: none"> • Knowledge of the types of adjustments to make, and the correct quantity of adjustment. • Knowledge of the location of equipment in the plant, how the equipment operates and normal operating parameters. • Knowledge of monitoring devices (such as meters, level indicators, temperature devices, flow indicators pressure indicators), how to read them and the ability to interpret readings. • Basic understanding of plant protective relays and metering and the ability to read and interpret relay targets. • Knowledge of PLCs (Programmable Logic Controller), DCS (Distributive Control System) and turbine control devices. • Knowledge of safety standards and regulations and personal protective equipment and how to use it. • Ability to use tools such as hand tools, power tools, and meters. • Ability to use plant historian, read equipment histories and trend data, and record them. • Knowledge of standard operating procedures, documentation requirements, and required logs. • Knowledge of industry, plant, company, equipment, scientific, technical, tool, safety, and personnel terminology. • Knowledge of adjustments which are required seasonally. • Knowledge of government agency and environmental regulations. 	<ul style="list-style-type: none"> • Understands operation/interaction; manipulates technology for desired result; analyzes technology output; examines task/technology relationship. • Utilizes previous training and experience to predict outcomes; visually analyzes relationship between parts/whole and process/procedure and interprets charts, graphs and symbols. • Analyzes situations and information, considers risks and implications, and compiles multiple viewpoints. • Pays attention to details, demonstrates initiative, monitors performance standards and follows up on assigned tasks. • Monitors system performance, analyzes system operation, distinguishes trends in performance and diagnoses performance deviations.

KEY ACTIVITY	Performance Indicators How do we know when the task is performed well?	Technical Knowledge Skills, Abilities, Tools	Employability Skills SCANS Skills and Foundational Abilities
A5. Perform logging and record-keeping	<ul style="list-style-type: none"> • Logging is performed according to company and department policies and procedures. • Logs and appropriate files are input into database, filed or distributed to correct parties. • Logs are accurate, relevant, legible and complete and are completed in a timely manner. • Logging is understandable and succinct. • Correct terminology and abbreviations are used. • Status reports and other information are clearly communicated from shift to shift. • Logs are reviewed to keep current on plant conditions. • Changes in status are logged accurately and in a timely manner. 	<ul style="list-style-type: none"> • Knowledge of industry terminology and military time. • Knowledge of procedures to access files and use the logs. • Knowledge of company procedures. • Ability to prioritize content of logs and communications. • Knowledge of the location of equipment in the plant, how the equipment operates and normal operating parameters. 	<ul style="list-style-type: none"> • Records information accurately, creates original documents and summarizes information. • Utilizes integrated software, utilizes networks and manipulates information. • Understands technological requirements and results; analyzes task/technology relationship; proposes simple technological solutions. • Assists and encourages team members, actively participates, works to improve team skills and demonstrates commitment. • Confirms information and interprets, clarifies and influences communication. • Understands the system organization and hierarchy and follows processes and procedures.

KEY ACTIVITY	Performance Indicators How do we know when the task is performed well?	Technical Knowledge Skills, Abilities, Tools	Employability Skills SCANS Skills and Foundational Abilities
<p>A6. Monitor and analyze equipment performance</p>	<ul style="list-style-type: none"> • Equipment history and trend data are consulted when applicable. • Equipment is monitored for efficiency, safety, and operation within parameters. • Corrective actions are identified, and documentation is completed once corrective actions are taken. • Corrective actions are taken promptly according to company procedures. • Indications are properly verified. • Out of compliance or unsafe conditions are communicated to appropriate personnel effectively and in a timely manner. • Communication and collaboration with resident experts are conducted effectively. • Gauges and indicators are read and readings are noted to confirm they are within normal operating parameters. • Sights, sounds, feel and smell of equipment are noted as to confirm they are within normal operating parameters. • Vibrations are noted to confirm they are normal. • Pre-maintenance benchmarks are compared with post maintenance benchmarks to ensure the equipment components are operating properly. • When applicable, test instrumentation is properly installed to monitor equipment. 	<ul style="list-style-type: none"> • Knowledge of the location of equipment in the plant, how the equipment operates and normal operating parameters. • Knowledge of monitoring devices (such as meters, level indicators, temperature devices, flow indicators pressure indicators), how to read them and the ability to interpret readings. • Basic understanding of plant protective relays and metering and the ability to read and interpret relay targets. • Knowledge of PLCs (Programmable Logic Controller), DCS (Distributive Control System) and turbine control devices. • Knowledge of plant technical drawings and symbols. • Knowledge of safety standards and regulations (and personal protective equipment and how to use it. • Knowledge of standard operating procedures, documentation requirements, and required logs. • Ability to use plant historian, read equipment histories and trend data, and record them. • Knowledge of corrective actions and responses for specific problems. • Knowledge of industry, plant, company, equipment, scientific, technical, tool, safety, and personnel terminology. • Knowledge of how systems interrelate and the impact of this interrelationship on plant operations. • Ability to read and understand gauges and indicators and normal operating levels. • Ability to perceive changes based on sensory perception (sight, sound, feel and smell) and to respond to them. • Knowledge of normal vibrations, sights, sounds and smells of equipment. • Ability to analyze comparison of pre-and-post maintenance benchmarks. • Knowledge of test instrumentation and how to install it to monitor equipment • Ability to check test equipment for calibration. 	<ul style="list-style-type: none"> • Understands operation/interaction; manipulates technology for desired result; analyzes technology output; examines task/technology relationship. • Identifies relevant details, facts, specifications, follows set of instructions and qualifies/analyzes information. • Pays attention to details, demonstrates initiative, monitors performance standards and follows up on assigned tasks. • Monitors system performance, analyzes system operation, distinguishes trends in performance and diagnoses performance deviations. • Interprets information, transfers information between formats and proposes new processes. • Efficiently manages time, prioritizes daily tasks, prepares schedule and monitors and adjusts task sequence.

KEY ACTIVITY	Performance Indicators How do we know when the task is performed well?	Technical Knowledge Skills, Abilities, Tools	Employability Skills SCANS Skills and Foundational Abilities
<p>A7. Respond to equipment emergencies, malfunctions and alarms</p>	<ul style="list-style-type: none"> • Responses to alarms are appropriate to the alarm. • Emergencies and malfunctions are investigated and documented in accordance with company policies and procedures. • Proper corrective actions are taken in a timely manner. • Equipment is correctly returned to service. • Equipment is properly repaired and tested following malfunction or emergency to ensure it is working properly. • Emergency responses are properly initiated where applicable. 	<ul style="list-style-type: none"> • Ability to recognize alarms, and knowledge of the meaning of the alarm and the associated corrective action/s. • Knowledge of company policies and procedures and emergency procedures and policies • Knowledge of monitoring devices (such as meters, level indicators, temperature devices, flow indicators pressure indicators), how to read them and the ability to interpret readings. • Basic understanding of plant protective relays and metering and the ability to read and interpret relay targets Knowledge of PLCs (Programmable Logic Controller), DCS (Distributive Control System) and turbine control devices. • Knowledge of plant technical drawings and symbols. • Knowledge of high voltage switching and substation components, and circuit breakers and disconnects. • Knowledge of safety standards and regulations and personal protective equipment and how to use it. • Knowledge of standard operating procedures, documentation requirements, and required logs. • Ability to use tools such as hand tools, power tools, and meters. • Ability to use plant historian, read equipment histories and trend data, and record them. • Knowledge of industry, plant, company, equipment, scientific, technical, tool, safety, and personnel terminology. • Knowledge of how systems interrelate and the impact of this interrelationship on plant operations. 	<ul style="list-style-type: none"> • Recognizes accuracy of information, interprets information and prepares basic summaries. • Analyzes possible causes, generates and evaluates solutions and generates and evaluates solutions. • Defends own viewpoints, accepts responsibility for own behavior and understands own impact on others. • Efficiently manages time, prioritizes daily tasks, prepares schedule and monitors and adjusts task sequence. • Understands technological requirements and results; analyzes task/technology relationship; proposes simple technological solutions. • Pays attention to details, demonstrates initiative, monitors performance standards and follows up on assigned tasks. • Confirms information and interprets, clarifies and influences communication.

KEY ACTIVITY	Performance Indicators How do we know when the task is performed well?	Technical Knowledge Skills, Abilities, Tools	Employability Skills SCANS Skills and Foundational Abilities
<p>A8. <i>Train others to understand plant systems and use equipment</i></p>	<ul style="list-style-type: none"> • Trainees are given a complete orientation to the equipment and plant systems. • All important information regarding equipment safety is communicated clearly and effectively. • All workers are given safety indoctrination. • Trainees are provided all necessary materials as per company or site-specific policies. • Training is delivered effectively and trainees' skills are verified. 	<ul style="list-style-type: none"> • Knowledge of the location of equipment in the plant, how the equipment operates and normal operating parameters. • Knowledge of power plant fundamentals. • Knowledge of integrated plant operations. • Knowledge of monitoring devices (such as meters, level indicators, temperature devices, flow indicators pressure indicators), how to read them and the ability to interpret readings. • Basic understanding of plant protective relays and metering and the ability to read and interpret relay targets Knowledge of PLCs (Programmable Logic Controller), DCS (Distributive Control System) and turbine control devices. • Knowledge of plant technical drawings and symbols. • Knowledge of high voltage switching and substation components, and circuit breakers and disconnects. • Knowledge of safety standards and regulations and personal protective equipment and how to use it. • Ability to use tools such as hand tools, power tools, and meters. • Ability to use plant historian, read equipment histories and trend data, and record them. • Knowledge of standard operating procedures, documentation requirements, and required logs. • Knowledge of industry, plant, company, equipment, scientific, technical, tool, safety, and personnel terminology. 	<ul style="list-style-type: none"> • Conducts task-specific training, coaches others to apply related concepts and provides constructive feedback/reinforcement. • Establishes rapport with co-workers and customers; modifies behavior to environment; shows understanding for others and encourages cooperation and negotiation. • Adheres to standards, demonstrates commitment to excellence and leads by example. • Recognizes differences, understands the legal aspects of discrimination, respects the rights of others recognizes the value of diversity. • Communicates appropriate verbal/non-verbal messages, actively participates in discussion and presents complex ideas and information. • Interprets and applies new knowledge and experience and analyzes application of learning tools. • Understands the system organization and hierarchy and follows processes and procedures.

KEY ACTIVITY	Performance Indicators How do we know when the task is performed well?	Technical Knowledge Skills, Abilities, Tools	Employability Skills SCANS Skills and Foundational Abilities
A9 Perform housekeeping	<ul style="list-style-type: none"> • Tools are stored in proper location. • Materials are kept in a safe manner. • Unsafe conditions are identified and reported promptly, and correct action is initiated. • Plant is clean and clear of safety hazards. • All appropriate safety equipment is present and in proper working order. • Tools are cleaned, returned to proper location, and tagged if broken. • All hazardous materials and environmental procedures are followed in accordance with company policies and applicable laws and regulations. 	<ul style="list-style-type: none"> • Knowledge of proper cleaning and storage procedures. • Ability to perform inspection of tools and materials (restock, recycle or repair). • Knowledge and ability to identify and correct for unsafe conditions. • Knowledge of hazardous material laws, rules and regulations. • Ability to identify nonfunctional tools for repair and knowledge of communications and tagging requirements for nonfunctioning tools. • Knowledge of safety equipment and its usage. 	<ul style="list-style-type: none"> • Interprets and applies new knowledge and experience and analyzes application of learning tools. • Adheres to standards, demonstrates commitment to excellence and leads by example. • Pays attention to details, demonstrates initiative, monitors performance standards and follows up on assigned tasks. • Understands technological requirements and results; analyzes task/technology relationship; proposes simple technological solutions.

Cluster: Combustion Turbine Plant Technician/Specialist
Critical Work Function: B. Maintain and Repair Plant Systems and Equipment

KEY ACTIVITY	Performance Indicators How do we know when the task is performed well?	Technical Knowledge Skills, Abilities, Tools	Employability Skills SCANS Skills and Foundational Abilities
<p>B1. Perform troubleshooting</p>	<ul style="list-style-type: none"> • P & ID (Process and Instrument Diagram), plant historian, and technical manuals and schematics are consulted as necessary. • Information about the nature and possible causes of failure is systematically gathered. • Diagnosis is timely and effective. • Manufacturer's performance specifications are used and manufacturer's technical support is consulted when evaluating equipment performance. • Troubleshooting is performed in a safe manner. 	<ul style="list-style-type: none"> • Ability to use P&ID, plant historian, technical manuals and schematics. • Knowledge of the system and equipment, and how it interacts with other systems. • Knowledge of and ability to perform diagnostic tests, use test equipment and interpret the output from the tests and diagnostic equipment. • Knowledge of basic troubleshooting processes and procedures. • Ability to access and read equipment logs, sequence of events recorder and histories. • Ability to participate in root cause analysis. • Ability to execute lockout/tagout procedures. • Knowledge of multiple trades and crafts and their functional boundaries and nomenclature. • Ability to read and understand manufacturer's specifications and manuals and to access technical support. • Knowledge of safe work practices. • Ability to disassemble equipment. • Knowledge of sequence o events recorder. 	<ul style="list-style-type: none"> • Demonstrates creative thinking process while problem solving; develops creative solutions and applies them to new situations. • Analyzes possible causes, generates and evaluates solutions and generates and evaluates solutions. • Uses mathematical processes and interprets mathematical data. • Utilizes previous training and experience to predict outcomes; visually analyzes relationship between parts/whole and process/procedure and interprets charts, graphs and symbols. • Understands operation/interaction; manipulates technology for desired result; analyzes technology output; examines task/technology relationship. • Applies and analyzes rules and principles to processes and procedures and uses logic to draw conclusions. • Interprets and applies new knowledge and experience and analyzes application of learning tools.

KEY ACTIVITY	Performance Indicators How do we know when the task is performed well?	Technical Knowledge Skills, Abilities, Tools	Employability Skills SCANS Skills and Foundational Abilities
<p>B2. Perform preventive and corrective maintenance</p>	<ul style="list-style-type: none"> • Hazardous materials procedures are followed with respect to handling and disposal. • Safety and environmental procedures are followed and proper personal protective equipment is worn or used. • Preventive maintenance procedures are completely followed. • Maintenance is performed with qualified personnel to ensure that the job is performed safely and efficiently. • Maintenance job is documented and verified according to company or department procedure. • Required maintenance is performed correctly and completed on time. • Suggestions to revise maintenance plan are made to appropriate personnel effectively and in a timely manner. • Where applicable, lockout tagout is correctly performed. • Equipment outage during preventive and corrective maintenance is requested and/or scheduled in accordance with company policy. • Preventive maintenance sampling is performed correctly and documentation is properly filled out and filed. 	<ul style="list-style-type: none"> • Complete understanding of the operational system. • Ability to read and interpret manufacturer's specifications and recommendations and PM procedures. • Knowledge of hazardous materials and safety and environmental procedures. • Knowledge of preventive maintenance requirements. • Knowledge of company policies and procedures. • Knowledge of computerized maintenance management system. • Knowledge of sampling procedures. 	<ul style="list-style-type: none"> • Determines system components to modify and improve; examines proposed modifications, improvements; analyzes goals and constraints. • Utilizes integrated software, utilizes networks and manipulates information. • Records information accurately, creates original documents and summarizes information. • Troubleshoots and corrects malfunctions and failures; evaluates performance of technology; analyzes failures. • Interprets and converts numerical data and predicts arithmetic results.

KEY ACTIVITY	Performance Indicators How do we know when the task is performed well?	Technical Knowledge Skills, Abilities, Tools	Employability Skills SCANS Skills and Foundational Abilities
B3. Gather materials, tools and equipment	<ul style="list-style-type: none"> • Special tools, parts and equipment are located in a timely manner. • Repaired parts are checked to ensure they meet specifications. • If a part is not available, follow-up occurs to ensure that adequate supplies are maintained. • Calibration and certification of tools are ensured where applicable. • Tool boxes are properly maintained. • All required tools, equipment and lubricants for the job are assembled at the job site. • Tools and equipment are checked to insure they are in safe and proper working order. • Procedures regarding nonfunctioning tools and equipment are followed. • Recommendations for acquisition of new tools are made to appropriate personnel. 	<ul style="list-style-type: none"> • Knowledge of tool terminology and the locations of tools, parts and equipment. • Knowledge of tools such as hand tools and precision measuring tools. • Knowledge of different types of materials and parts and their application. • Ability to calibrate tools and knowledge of certification requirements. • Ability to plan and organize relevant materials and tools prior to job site work • Ability to properly inspect tools and submit nonfunctional tools for repair. • Ability to use prior documentation for planning and organizing work. • Ability to anticipate new equipment, tool needs and requisitions to perform necessary work and improve efficiency and safety. • Knowledge of established policies and procedures. 	<ul style="list-style-type: none"> • Orders and maintains inventory and monitors safe and efficient utilization of materials. • Pays attention to details, demonstrates initiative, monitors performance standards and follows up on assigned tasks. • Interprets and converts numerical data and predicts arithmetic results. • Interprets information, transfers information between formats and proposes new processes. • Selects data relevant to the task, predicts outcomes, analyzes data and integrates multiple items of data.

KEY ACTIVITY	Performance Indicators How do we know when the task is performed well?	Technical Knowledge Skills, Abilities, Tools	Employability Skills SCANS Skills and Foundational Abilities
B4 Perform repairs	<ul style="list-style-type: none"> • Work is performed safely in accordance with company policies and procedures and in accordance with all applicable laws and regulations. • Repair procedures are followed. • During repair process, equipment is thoroughly inspected to identify other repair needs. • Where appropriate, repair plan and job safety/hazard analysis are effectively communicated to appropriate personnel in a timely manner. • Replaced parts are properly disposed of in accordance with safety and environmental procedures or they are refurbished and returned to stock. • Post maintenance testing is performed to ensure equipment is in proper working order. • Return to service documentation is prepared and submitted as required. • Housekeeping procedures are followed. • Where applicable contract workers are properly supervised to ensure work complies with all company procedures. 	<ul style="list-style-type: none"> • Ability to track how parts and equipment disassembled so they can be correctly put back together. • Knowledge of company policies and procedures. • Knowledge of technical requirements and manufacturer's recommended procedures for specifications of parts to be repaired and inspection procedures. • Knowledge of equipment function and purpose within the system, and how they affect other systems. • Knowledge of the different kinds of expertise required to complete the repair, and knowledge of the roles and responsibilities of all parties involved. • Ability to participate in root cause analysis and possible adverse effects of malfunction. • Ability to properly test and validate successful repair. • Knowledge of proper disposal and refurbishing procedures for parts and repairs. • Ability to interact with internal and external customers (other departments or vendors) and contractors. • Knowledge of housekeeping practices. 	<ul style="list-style-type: none"> • Understands technological requirements and results; analyzes task/technology relationship; proposes simple technological solutions. • Uses mathematical processes and interprets mathematical data. • Interprets and converts numerical data and predicts arithmetic results. • Recognizes job tasks, and distributes and analyzes work assignments. • Orders and maintains inventory and monitors safe and efficient utilization of materials.

KEY ACTIVITY	Performance Indicators How do we know when the task is performed well?	Technical Knowledge Skills, Abilities, Tools	Employability Skills SCANS Skills and Foundational Abilities
B5 Document maintenance and repair of plant systems & equipment	<ul style="list-style-type: none"> • Documentation is performed according to company and department policies and procedures. • Preventive maintenance schedule is properly adjusted to reflect repairs made. • Documentation is accurate, legible and complete and is completed in a timely manner. • Documentation is understandable relevant and succinct. 	<ul style="list-style-type: none"> • Knowledge of documentation policies and procedures. • Ability to record relevant and accurate data into manual and electronic system. • Understanding of how documentation and procedures affect critical operations and timelines. • Ability to report findings and make recommendations based on documented history and findings. • Understanding of the operational system and how equipment maintenance issues can adversely impact operations. • Ability to use correct terminology. 	<ul style="list-style-type: none"> • Records information accurately, creates original documents and summarizes information. • Utilizes integrated software, utilizes networks and manipulates information. • Adheres to standards, demonstrates commitment to excellence and leads by example. • Interprets information, transfers information between formats and proposes new processes. • Recognizes accuracy of information, interprets information and prepares basic summaries. <p>Understands the system organization and hierarchy and follows processes and procedures.</p>

KEY ACTIVITY	Performance Indicators	Technical Knowledge	Employability Skills
B6 Perform housekeeping	<ul style="list-style-type: none"> • How do we know when the task is performed well? • Tools are stored in proper location. • Materials are kept in a safe manner. • Unsafe conditions are identified and reported promptly, and correct action is initiated. • Shop is organized to maximize efficiency • Plant is clean and clear of safety hazards. • All appropriate safety equipment is present and in proper working order. • Tools are cleaned, returned to proper location, and tagged if broken. • All hazardous materials and environmental procedures are followed in accordance with company policies and applicable laws and regulations. 	<ul style="list-style-type: none"> • Skills, Abilities, Tools • Knowledge of proper cleaning and storage procedures. • Ability to perform inspection of tools and materials (restock, recycle or repair) • Knowledge and ability to identify and correct for unsafe conditions. • Knowledge of hazardous material laws, rules and regulations. • Ability to identify nonfunctional tools for repair and knowledge of communications and tagging requirements for nonfunctioning tools. • Knowledge of safety equipment and its usage. 	<ul style="list-style-type: none"> • SCANS Skills and Foundational Abilities • Orders and maintains inventory and monitors safe and efficient utilization of materials. • Adheres to standards, demonstrates commitment to excellence and leads by example. • Analyzes situations and information, considers risks and implications, and compiles multiple viewpoints. • Pays attention to details, demonstrates initiative, monitors performance standards and follows up on assigned tasks.

KEY ACTIVITY	Performance Indicators How do we know when the task is performed well?	Technical Knowledge Skills, Abilities, Tools	Employability Skills SCANS Skills and Foundational Abilities
<p>B7 Fabricate parts, pieces and systems, specialty devices & tools</p>	<ul style="list-style-type: none"> • Parts, structures and systems are built to specification and design, and meet safety laws and regulations. • Parts, structures and systems are built within budget where applicable. • Work is performed safely, and personal protective equipment is worn in accordance with safety policies and all applicable laws and regulations. • Proper tools and materials are used correctly. • Where applicable, fabrications are inspected upon completion approvals are obtained. • Documentation is completed accurately and submitted according to procedure, as required. • Certifications are obtained and maintained where required. • Where applicable, specifications are written in accordance with applicable codes, laws, and safety requirements. • Job is properly planned to ensure effective and efficient use of resources. • Weld procedures are certified in accordance with national standards where applicable, proper gas and filler materials are used and gas bottles are stored and shipped correctly. 	<ul style="list-style-type: none"> • Knowledge of structures, parts, and special devices. • Ability to identify and use hand tools and power tools (electric, pneumatic, battery operated), measuring tools and machine tools machine tools, (lathes, drill presses, milling machines, bench and surface grinders, dividing heads). • Ability to identify and use equipment such as oxygen acetylene torches, arc welding machines and gas welding machines. • Knowledge of welding processes and associated equipment such as SMAW (Shielded Metal Arc Welding), GMAW (Gas Metal Arc Welding), and TIG (Tungsten Inert Gas) and welding certification requirements. • Ability to read technical drawing and knowledge of codes. • Knowledge of precision layout techniques and procedures. • Knowledge of ground preparation procedures. • Knowledge of safety laws & regulations, OSHA, (Occupational Safety and Health Administration) WISHA (Washington Industrial Safety and Health), and personal protective equipment and how to use it. • Knowledge of building materials such as lumber, steel, hardware, aluminum, fasteners, fiberglass, and composites; knowledge of metallurgy. • Ability to recognize types, shapes, and sizes of materials. • Ability to plan and complete the job. • Knowledge of inspection and approval requirements and procedures. • Knowledge of documentation requirements and procedures. • Knowledge of structure, construction, tool and equipment terminology. • Knowledge of standard building practices. • Knowledge of storage and shipping of gas bottles. 	<ul style="list-style-type: none"> • Utilizes previous training and experience to predict outcomes; visually analyzes relationship between parts/whole and process/procedure and interprets charts, graphs and symbols. • Understands technological requirements and results; analyzes task/technology relationship; proposes simple technological solutions. • Orders and maintains inventory and monitors safe and efficient utilization of materials. • Interprets and converts numerical data and predicts arithmetic results. • Uses mathematical processes and interprets mathematical data. • Identifies relevant details, facts, specifications, follows set of instructions and qualifies/analyzes information.

KEY ACTIVITY	Performance Indicators How do we know when the task is performed well?	Technical Knowledge Skills, Abilities, Tools	Employability Skills SCANS Skills and Foundational Abilities
B8 Install & test equipment	<ul style="list-style-type: none"> • Moving and removal of equipment is performed safely and in accordance with all applicable laws and regulations. • Plan of action is accurately followed. • Lockout tagout is performed at the beginning of the project and removed upon completion. • Input is given to modify the plan of action as required during installation, customization or upgrade. • Vendors are appropriately involved. • Prior to starting tests, communications are made to appropriate parties regarding the test. • Testing is performed in accordance with company and industry protocols and procedures. • Test results are properly documented and submitted. • Return to service notification is completed. • Test equipment that is used for testing is checked and calibrated and used properly. 	<ul style="list-style-type: none"> • Knowledge of safety regulations, requirements and policies regarding equipment. • Ability to implement and follow a plan of action. • Ability to modify the plans of action as needed. • Ability to understand and follow vendors' equipment requirements and recommendations. • Knowledge of lock out tag out concepts and procedures. • Knowledge of equipment moving and removal procedures. • Knowledge of vendor, equipment and system terminology. • Knowledge of testing procedures and parameters. • Ability to perform testing in accordance with company policy and procedures. • Knowledge and application of relevant safety policies and procedures. • Knowledge of how to interpret, apply and document test results to validate repair or installation. • Knowledge of test equipment calibration and use. 	<ul style="list-style-type: none"> • Utilizes previous training and experience to predict outcomes; visually analyzes relationship between parts/whole and process/procedure and interprets charts, graphs and symbols. • Determines system components to modify and improve; examines proposed modifications, improvements; analyzes goals and constraints. • Selects data relevant to the task, predicts outcomes, analyzes data and integrates multiple items of data. • Recognizes accuracy of information, interprets information and prepares basic summaries. • Understands technological requirements and results; analyzes task/technology relationship; proposes simple technological solutions. • Analyzes situations and information, considers risks and implications, and compiles multiple viewpoints.

KEY ACTIVITY	Performance Indicators How do we know when the task is performed well?	Technical Knowledge Skills, Abilities, Tools	Employability Skills SCANS Skills and Foundational Abilities
B9. Perform logging and record-keeping	<ul style="list-style-type: none"> • Logging is performed according to company and department policies and procedures. • Logs and appropriate files are input into database, filed or distributed to correct parties. • Logs are accurate, relevant, legible and complete and are completed in a timely manner. • Logging is understandable and succinct. • Correct terminology and abbreviations are used. • Status reports and other information are clearly communicated from shift to shift. • Logs are reviewed to keep current on plant conditions. • Changes in status are logged accurately and in a timely manner. 	<ul style="list-style-type: none"> • Knowledge of industry terminology and military time. • Knowledge of procedures to access files and use the logs. • Knowledge of company procedures. • Ability to prioritize content of logs and communications. • Knowledge of the location of equipment in the plant, how the equipment operates and normal operating parameters. 	<ul style="list-style-type: none"> • Records information accurately, creates original documents and summarizes information. • Utilizes integrated software, utilizes networks and manipulates information. • Understands technological requirements and results; analyzes task/technology relationship; proposes simple technological solutions. • Assists and encourages team members, actively participates, works to improve team skills and demonstrates commitment. • Confirms information and interprets, clarifies and influences communication. • Understands the system organization and hierarchy and follows processes and procedures.

Cluster: Combustion Turbine Plant Technician/Specialist

Critical Work Function: C. Operate Plant Support Equipment (i.e.) Forklifts, Cranes etc.

KEY ACTIVITY	Performance Indicators How do we know when the task is performed well?	Technical Knowledge Skills, Abilities, Tools	Employability Skills SCANS Skills and Foundational Abilities
<p>C1. Inspect equipment</p>	<ul style="list-style-type: none"> • Pre start up checks or inspections are performed in accordance with company procedures. • Proper tools are used and measurements are accurate. • Safety procedures are followed. • Inspection documentation is filled out completely and filed in a timely manner. • Equipment malfunctions and readiness are communicated to appropriate personnel effectively and in a timely manner. 	<ul style="list-style-type: none"> • Knowledge of equipment and function and use. • Knowledge of approved company and manufacturers pre-start-up checks and inspection procedures and specifications. • Ability to use proper tools for inspection and to measure accurately. • Ability to accurately complete and file documentation forms manually and electronically. • Knowledge of inspection results and equipment terminology. 	<ul style="list-style-type: none"> • Pays attention to details, demonstrates initiative, monitors performance standards and follows up on assigned tasks. • Monitors system performance, analyzes system operation, distinguishes trends in performance and diagnoses performance deviations. • Selects data relevant to the task, predicts outcomes, analyzes data and integrates multiple items of data. • Utilizes previous training and experience to predict outcomes; visually analyzes relationship between parts/whole and process/procedure and interprets charts, graphs and symbols. • Analyzes possible causes, generates and evaluates solutions and generates and evaluates solutions. • Records information accurately, creates original documents and summarizes information.

KEY ACTIVITY	Performance Indicators	Technical Knowledge	Employability Skills
<p>C2. Monitor equipment indicators to ensure it is operating correctly</p>	<ul style="list-style-type: none"> • How do we know when the task is performed well? • Gauges and indicators fall within normal operating parameters. • Sights, sounds, feel and smell of equipment are within normal operating parameters. • Vibrations are normal. 	<ul style="list-style-type: none"> • Skills, Abilities, Tools • Ability to read and understand gauges and indicators and normal operating levels. • Ability to perceive changes based on sensory perception (sight, sound, feel and smell). • Ability to communicate and respond to sensory based changes. • Knowledge of normal vibrations, sights, sounds and smells of equipment. 	<ul style="list-style-type: none"> • SCANS Skills and Foundational Abilities • Monitors system performance, analyzes system operation, distinguishes trends in performance and diagnoses performance deviations. • Demonstrates honesty and trustworthiness, accepts responsibility for own behavior, analyzes implications of decisions and recommends ethical course of action. • Interprets and converts numerical data and predicts arithmetic results. • Selects data relevant to the task, predicts outcomes, analyzes data and integrates multiple items of data. • Utilizes previous training and experience to predict outcomes; visually analyzes relationship between parts/whole and process/procedure and interprets charts, graphs and symbols.

KEY ACTIVITY	Performance Indicators How do we know when the task is performed well?	Technical Knowledge Skills, Abilities, Tools	Employability Skills SCANS Skills and Foundational Abilities
C3. Operate rolling / mobile equipment	<ul style="list-style-type: none"> • Proper endorsement, license and authorization requirements are met. • Equipment is operated safely, in accordance with all applicable laws and regulations. • Inspection schedule is thoroughly checked to ensure it has been followed. • Proper training and certification for operating and rigging has been obtained. • Rigging requirements are followed. • Lift plans are correctly developed and followed when required. 	<ul style="list-style-type: none"> • Knowledge of and ability to obtain licenses certifications and authorizations as needed. • Knowledge of safe equipment operation and manufactures specifications. • Knowledge of company safety policies and equipment operation procedures. • Knowledge of and ability to apply proper rigging techniques. • Ability to develop and implement a lift plan including staffing and technical requirements. • Knowledge of inspection schedule. 	<ul style="list-style-type: none"> • Recognizes job tasks, and distributes and analyzes work assignments. • Analyzes situations and information, considers risks and implications, and compiles multiple viewpoints. • Uses mathematical processes and interprets mathematical data. • Pays attention to details, demonstrates initiative, monitors performance standards and follows up on assigned tasks. • Utilizes previous training and experience to predict outcomes; visually analyzes relationship between parts/whole and process/procedure and interprets charts, graphs and symbols.

KEY ACTIVITY	Performance Indicators	Technical Knowledge	Employability Skills
C4. Operate heavy lifting equipment	<ul style="list-style-type: none"> • How do we know when the task is performed well? • Checks are made to determine that an adequate number of people are assigned to the operation. • Safety procedures are followed, and personal protective equipment is worn in accordance with all applicable laws and regulations. • Proper training and certification for operating and rigging is obtained and maintained. • Rigging requirements are followed. • Lift plans are developed and followed when required. 	<ul style="list-style-type: none"> • Skills, Abilities, Tools • Knowledge of company safety policies and equipment operation procedures. • Knowledge of and ability to apply proper rigging techniques. • Knowledge of and ability to obtain required licenses and authorization as needed. • Ability to operate equipment safely in accordance with manufactures specifications. • Knowledge of development and implementation of a lift plan including staffing and technical requirements. • Knowledge of personal protective equipment and safety laws and regulations. 	<ul style="list-style-type: none"> • SCANS Skills and Foundational Abilities • Assists and encourages team members, actively participates, works to improve team skills and demonstrates commitment. • Recognizes accuracy of information, interprets information and prepares basic summaries. • Utilizes previous training and experience to predict outcomes; visually analyzes relationship between parts/whole and process/procedure and interprets charts, graphs and symbols. • Interprets and converts numerical data and predicts arithmetic results. • Understands operation/interaction; manipulates technology for desired result; analyzes technology output; examines task/technology relationship. • Uses mathematical processes and interprets mathematical data.

Cluster: Combustion Turbine Plant Technician/Specialist
Critical Work Function: D. Promote Reliability and Productivity

KEY ACTIVITY	Performance Indicators How do we know when the task is performed well?	Technical Knowledge Skills, Abilities, Tools	Employability Skills SCANS Skills and Foundational Abilities
D1. Prepare shift logs	<ul style="list-style-type: none"> • Shift turnover reports are clearly communicated. • Documentation is accessible to all appropriate parties. • Documentation is performed according to company and department policies and procedures. • Documents and appropriate files are input into database, filed and/or distributed to correct parties. • Documentation is understandable, relevant and succinct, and in a technical format. 	<ul style="list-style-type: none"> • Knowledge of equipment, system and maintenance terminology. • Knowledge of status reports. • Knowledge of documentation policies procedures. • Ability to use internal company computer maintenance management system. 	<ul style="list-style-type: none"> • Records information accurately, creates original documents and summarizes information. • Utilizes integrated software, utilizes networks and manipulates information. • Demonstrates honesty and trustworthiness, accepts responsibility for own behavior, analyzes implications of decisions and recommends ethical course of action. • Pays attention to details, demonstrates initiative, monitors performance standards and follows up on assigned tasks. • Demonstrates sensitivity to customer concerns and responds to and analyzes customer needs.

KEY ACTIVITY	Performance Indicators	Technical Knowledge	Employability Skills
<p>D2. Participate in meetings and problem solving groups</p>	<ul style="list-style-type: none"> • How do we know when the task is performed well? • Meetings are attended with active participation and with adequate preparation to be well informed about the meeting topic. • Information is accurately given and received. • Issues are accurately and thoroughly discussed and solutions are defined. • Communication is respectfully performed without discrimination. 	<ul style="list-style-type: none"> • Skills, Abilities, Tools • Knowledge of industry, plant, company, equipment, safety, regulatory, maintenance, repair and personnel terminology. • Knowledge of the power generation systems. • Knowledge of plant equipment. • Knowledge of the roles and responsibilities of company personnel and departments. 	<ul style="list-style-type: none"> • SCANS Skills and Foundational Abilities • Establishes rapport with co-workers and customers; modifies behavior to environment; shows understanding for others and encourages cooperation and negotiation. • Demonstrates creative thinking process while problem solving; develops creative solutions and applies them to new situations. • Defends own viewpoints, accepts responsibility for own behavior and understands own impact on others. • Analyzes possible causes, generates and evaluates solutions and generates and evaluates solutions. • Communicates appropriate verbal/non-verbal messages, actively participates in discussion and presents complex ideas and information. • Confirms information and interprets, clarifies and influences communication. • Recognizes differences, understands the legal aspects of discrimination, respects the rights of others recognizes the value of diversity.

KEY ACTIVITY	Performance Indicators How do we know when the task is performed well?	Technical Knowledge Skills, Abilities, Tools	Employability Skills SCANS Skills and Foundational Abilities
D3. Communicate job-specific needs to supervisors and coworkers	<ul style="list-style-type: none"> • Communication is sufficient to ensure that safety issues are understood and safety practices used. • The high priority of safety is communicated. • On-the-job issues and concerns are discussed and quickly resolved. • Communication demonstrates knowledge of internal and external customer and business needs. • Communication is clear and relevant to the situation. • Communication is made in a timely and accurate manner to the correct parties. • Communications are tracked and documented, as appropriate. • As situations arise, communication priorities are shifted to meet changing business and safety priorities. 	<ul style="list-style-type: none"> • Knowledge of the criticality of safety in the workplace. • Knowledge of industry, plant, company, equipment, safety, regulatory, maintenance, repair and personnel terminology. • Knowledge of internal and external customer and business needs. • Knowledge of resource requirements for jobs such as number of people, lengths of time and budgets. • Knowledge of the roles and responsibilities of company personnel and departments. 	<ul style="list-style-type: none"> • Communicates appropriate verbal/non-verbal messages, actively participates in discussion and presents complex ideas and information. • Identifies relevant details, facts, specifications, follows set of instructions and qualifies/analyzes information. • Interprets and applies new knowledge and experience and analyzes application of learning tools. • Confirms information and interprets, clarifies and influences communication. • Records information accurately, creates original documents and summarizes information. • Maintains self control, accepts constructive criticism, sets well defined/realistic goals and demonstrates commitment to self improvement.

KEY ACTIVITY	Performance Indicators	Technical Knowledge	Employability Skills
<p>D4 Develop & review work practices & procedures</p>	<ul style="list-style-type: none"> • How do we know when the task is performed well? • Manufacturer's recommendations and system requirements are actively used to guide implementation of processes and procedures. • Need for modified work practices and procedures is determined based on needs of the plant. • Suggestions for modified work practices are communicated to appropriate personnel in an effective manner. 	<ul style="list-style-type: none"> • Skills, Abilities, Tools • Knowledge of how systems interrelate and the impact of this interrelationship on plant operations. • Knowledge of manufacturer's specifications and system requirements. • Knowledge of objectives and goals for system reliability, environmental stewardship and regional accountability. • Understanding of the nature of equipment and failure. • Knowledge of plant standard operating procedures. 	<ul style="list-style-type: none"> • SCANS Skills and Foundational Abilities • Applies and analyzes rules and principles to processes and procedures and uses logic to draw conclusions. • Identifies relevant details, facts, specifications, follows set of instructions and qualifies/analyzes information. • Analyzes situations and information, considers risks and implications, and compiles multiple viewpoints. • Recognizes accuracy of information, interprets information and prepares basic summaries. • Understands the system organization and hierarchy and follows processes and procedures.

KEY ACTIVITY	Performance Indicators How do we know when the task is performed well?	Technical Knowledge Skills, Abilities, Tools	Employability Skills SCANS Skills and Foundational Abilities
<p>D5 Participate in management of change process</p>	<ul style="list-style-type: none"> • Proposals for change are accompanied by thorough analysis of system and process requirements. • On-the-job issues and concerns are thoroughly discussed. • Manufacturer's recommended system requirements are actively used to guide implementation of processes and procedures. • Need for modified work practices and procedures is determined based on needs of the plant • Modified work practices are peer-reviewed and approved by management prior to implementation. • New work practices and procedures meet company and federal standards, objectives and goals of system reliability, environmental stewardship and regional accountability. • Change implementation plans are effectively communicated to correct personnel. • Where applicable, change process is coordinated in an effective manner. • Documentation of change is completed in accordance with company policies and procedures. 	<ul style="list-style-type: none"> • Knowledge of how systems interrelate and the impact of this interrelationship on plant operations. • Knowledge of manufacturer's specifications and system requirements. • Knowledge of objectives and goals for system reliability, environmental stewardship and regional accountability. • Knowledge of company and federal work standards and peer reviews. • Understanding of the equipment operation and failure modes. 	<ul style="list-style-type: none"> • Adheres to standards, demonstrates commitment to excellence and leads by example. • Understands technological requirements and results; analyzes task/technology relationship; proposes simple technological solutions. • Understands operation/interaction; manipulates technology for desired result; analyzes technology output; examines task/technology relationship. • Determines system components to modify and improve; examines proposed modifications, improvements; analyzes goals and constraints. <p>Assists and encourages team members, actively participates, works to improve team skills and demonstrates commitment.</p>

Cluster: Combustion Turbine Plant Technician/Specialist
Critical Work Function: E. Maintain a Safe Work Environment

KEY ACTIVITY	Performance Indicators How do we know when the task is performed well?	Technical Knowledge Skills, Abilities, Tools	Employability Skills SCANS Skills and Foundational Abilities
<p>E1. Conduct safety inspections</p>	<ul style="list-style-type: none"> • Potential hazards are correctly identified and corrective actions for safety deviations are taken when possible and communicated to appropriate personnel. • Inspection findings are accurately reported and documented. • Routine tests / inspections are conducted on all safety equipment. • Inspections meet in all applicable laws and regulations. • Inspections include security equipment where applicable. 	<ul style="list-style-type: none"> • Knowledge of potential hazards and corrective actions for safety deviations. • Knowledge of reporting and documentation procedures. • Ability to perform routine tests on safety equipment. • Knowledge of safety laws and regulations. • Knowledge of safety/inspection procedures. 	<ul style="list-style-type: none"> • Demonstrates honesty and trustworthiness, accepts responsibility for own behavior, analyzes implications of decisions and recommends ethical course of action. • Selects data relevant to the task, predicts outcomes, analyzes data and integrates multiple items of data. • Troubleshoots and corrects malfunctions and failures; evaluates performance of technology; analyzes failures. • Assists and encourages team members, actively participates, works to improve team skills and demonstrates commitment. • Pays attention to details, demonstrates initiative, monitors performance standards and follows up on assigned tasks. • Records information accurately, creates original documents and summarizes information.

KEY ACTIVITY	Performance Indicators	Technical Knowledge	Employability Skills
<p>E2. Perform emergency drills and participate in emergency response teams</p>	<ul style="list-style-type: none"> • How do we know when the task is performed well? • Training and certification on relevant emergency, first aid and CPR (Cardiopulmonary Resuscitation) procedures are complete and up to date. • Emergency response complies with company and regulatory policies and procedures. 	<ul style="list-style-type: none"> • Skills, Abilities, Tools • Ability to use emergency equipment and knowledge of regulations regarding its use. • Knowledge of safety standards and regulations and personal protective equipment. • Ability to obtain applicable certifications. • Knowledge of emergency policies and procedures and emergency responses. • Knowledge of emergency phone numbers and address/locations within facilities. 	<ul style="list-style-type: none"> • SCANS Skills and Foundational Abilities • Assists and encourages team members, actively participates, works to improve team skills and demonstrates commitment. • Analyzes possible causes, generates and evaluates solutions and generates and evaluates solutions. • Establishes rapport with co-workers and customers; modifies behavior to environment; shows understanding for others and encourages cooperation and negotiation. • Conducts task-specific training, coaches others to apply related concepts and provides constructive feedback/reinforcement. • Applies and analyzes rules and principles to processes and procedures and uses logic to draw conclusions. • Pays attention to details, demonstrates initiative, monitors performance standards and follows up on assigned tasks.

KEY ACTIVITY	Performance Indicators How do we know when the task is performed well?	Technical Knowledge Skills, Abilities, Tools	Employability Skills SCANS Skills and Foundational Abilities
<p>E3. Identify and report unsafe conditions and take corrective action</p>	<ul style="list-style-type: none"> • Conditions that present a threat to health, safety and the environment are identified, reported, and documented promptly. • Corrective actions are identified, and documentation is completed once corrective actions are taken. • Appropriate parties are consulted about corrective actions. • Corrective actions are taken promptly according to company procedures. • Follow-up procedures are followed. • Accident reports are filled out and submitted in accordance with all applicable laws, regulations and company policies. 	<ul style="list-style-type: none"> • Knowledge of the components, conditions and procedures utilized in a safe working environment and the ability to identify an unsafe condition. • Understanding of the consequences of safety situations such as systems under pressure and stored energy systems vs. low risk maintenance items. • Knowledge of documentation procedures. • Knowledge of procedures for taking corrective actions. • Knowledge of accident reports and filing requirements. 	<ul style="list-style-type: none"> • Pays attention to details, demonstrates initiative, monitors performance standards and follows up on assigned tasks. • Demonstrates honesty and trustworthiness, accepts responsibility for own behavior, analyzes implications of decisions and recommends ethical course of action. • Utilizes previous training and experience to predict outcomes; visually analyzes relationship between parts/whole and process/procedure and interprets charts, graphs and symbols. • Records information accurately, creates original documents and summarizes information. • Applies and analyzes rules and principles to processes and procedures and uses logic to draw conclusions. • Understands the system organization and hierarchy and follows processes and procedures.

KEY ACTIVITY	Performance Indicators How do we know when the task is performed well?	Technical Knowledge Skills, Abilities, Tools	Employability Skills SCANS Skills and Foundational Abilities
E4. Lead or participate in safety meetings	<ul style="list-style-type: none"> • Training covers all topics and procedures needed to facilitate employee safety. • Training makes clear the need and processes for employees to raise safety concerns, ask questions, and receive additional training. • Training is documented according to company requirements. • Training meets all relevant laws, policies, and regulations. • Where applicable safety information is tailored to meet the requirements of a specific job. • Mandatory trainings are attended with full attention and participation. 	<ul style="list-style-type: none"> • Knowledge of all topics and procedures required for employee safety. • Knowledge of company requirements for training documentation. • Knowledge of safety laws and regulations. • Knowledge of safe work practices. • Knowledge of terminology for generation facilities and processes including tools, equipment and systems. • Knowledge of specific job procedures and safety requirements. • Knowledge of mandatory training requirements. 	<ul style="list-style-type: none"> • Interprets and applies new knowledge and experience and analyzes application of learning tools. • Communicates appropriate verbal/non-verbal messages, actively participates in discussion and presents complex ideas and information. • Assists and encourages team members, actively participates, works to improve team skills and demonstrates commitment. • Confirms information and interprets, clarifies and influences communication. • Conducts task-specific training, coaches others to apply related concepts and provides constructive feedback/reinforcement. • Adheres to standards, demonstrates commitment to excellence and leads by example.

KEY ACTIVITY	Performance Indicators How do we know when the task is performed well?	Technical Knowledge Skills, Abilities, Tools	Employability Skills SCANS Skills and Foundational Abilities
E5. Offload chemicals	<ul style="list-style-type: none"> • Hazardous materials and plant procedures are followed. • Safety certification of contractor is ensured. • Spills are avoided and when required SPCC (Spill Prevention Control and Counter Measures) procedures are followed. • Hazardous materials training is attended and documentation of attendance is maintained. • Correct PPE (Personal Protective Equipment) is worn. 	<ul style="list-style-type: none"> • Knowledge of hazardous materials and plant procedures. • Knowledge of safety certification requirements for contractors. • Knowledge of environmental mandates regarding chemicals. • Knowledge of hazardous materials training requirements. • Knowledge of MSDS (Material Safety Data Sheets). • Knowledge of job activities and associated safety hazards and PPE. 	<ul style="list-style-type: none"> • Orders and maintains inventory and monitors safe and efficient utilization of materials. • Demonstrates honesty and trustworthiness, accepts responsibility for own behavior, analyzes implications of decisions and recommends ethical course of action. • Utilizes previous training and experience to predict outcomes; visually analyzes relationship between parts/whole and process/procedure and interprets charts, graphs and symbols. • Recognizes differences, understands the legal aspects of discrimination, respects the rights of others recognizes the value of diversity. • Analyzes possible causes, generates and evaluates solutions and generates and evaluates solutions. • Demonstrates sensitivity to customer concerns and responds to and analyzes customer needs.

KEY ACTIVITY	Performance Indicators How do we know when the task is performed well?	Technical Knowledge Skills, Abilities, Tools	Employability Skills SCANS Skills and Foundational Abilities
E6. Perform job safety analysis / tailgate	<ul style="list-style-type: none"> • Job activities and potential safety hazards and associated PPE (Personal Protective Equipment) and concerns are correctly identified and communicated to appropriate personnel effectively and in a timely manner. • Documentation is completed in accordance with company policies and procedures. 	<ul style="list-style-type: none"> • Knowledge of job activities and associated safety hazards and PPE. • Knowledge of job safety analysis documentation procedures. 	<ul style="list-style-type: none"> • Utilizes previous training and experience to predict outcomes; visually analyzes relationship between parts/whole and process/procedure and interprets charts, graphs and symbols. • Interprets and applies new knowledge and experience and analyzes application of learning tools. • Understands technological requirements and results; analyzes task/technology relationship; proposes simple technological solutions. • Interprets information, transfers information between formats and proposes new processes. • Applies and analyzes rules and principles to processes and procedures and uses logic to draw conclusions.

Cluster: Combustion Turbine Plant Technician/Specialist
Critical Work Function: F. Ensure Regulatory Compliance

KEY ACTIVITY	Performance Indicators How do we know when the task is performed well?	Technical Knowledge Skills, Abilities, Tools	Employability Skills SCANS Skills and Foundational Abilities
F1 Perform compliance activities	<ul style="list-style-type: none"> • Monitors are checked in accordance with organization policies and procedures and all applicable laws and regulations. • Instruments are calibrated regularly in accordance with all applicable laws and regulations and organization policies and procedures. • Non compliance conditions are reported to proper personnel and authorities in accordance with all applicable laws, regulations and company policies. • Non compliance conditions are corrected and logged in accordance with plant permit and regulatory requirements. 	<ul style="list-style-type: none"> • Knowledge of environmental monitors. • Knowledge of instrument calibration procedures, policies and regulations. • Knowledge of plant and regulatory compliance requirements. 	<ul style="list-style-type: none"> • Demonstrates honesty and trustworthiness, accepts responsibility for own behavior, analyzes implications of decisions and recommends ethical course of action. • Utilizes integrated software, utilizes networks and manipulates information. • Identifies relevant details, facts, specifications, follows set of instructions and qualifies/analyzes information. • Records information accurately, creates original documents and summarizes information.
F2 Maintain discharge water quality	<ul style="list-style-type: none"> • Water monitors are checked in accordance with organization policies and procedures and all applicable laws and regulations. • Instruments are calibrated regularly in accordance with all applicable laws and regulations and organization policies and procedures. • Water exceedences are reported to proper authorities in accordance with all applicable laws, regulations and company policies. • SWPP (Storm Water Pollution Prevention) equipment is properly maintained • SPCC (spill prevention containment and control) equipment is properly maintained • Non compliance conditions are corrected and logged in accordance with plant permit. 	<ul style="list-style-type: none"> • Knowledge of water quality requirements and regulations and specifications of plant permit. • Knowledge of instrument calibration procedures, policies and regulations. • Knowledge of spill containment procedures, laws and regulations. • Knowledge of SPCC and SWPP equipment, its location and applicable maintenance policies and procedures. 	<ul style="list-style-type: none"> • Demonstrates honesty and trustworthiness, accepts responsibility for own behavior, analyzes implications of decisions and recommends ethical course of action. • Utilizes integrated software, utilizes networks and manipulates information. • Identifies relevant details, facts, specifications, follows set of instructions and qualifies/analyzes information. • Records information accurately, creates original documents and summarizes information.

KEY ACTIVITY	Performance Indicators How do we know when the task is performed well?	Technical Knowledge Skills, Abilities, Tools	Employability Skills SCANS Skills and Foundational Abilities
F3 Maintain air quality	<ul style="list-style-type: none"> • Air monitors are checked in accordance with organization policies and procedures and all applicable laws and regulations. • Instruments are calibrated regularly in accordance with all applicable laws and regulations and organization policies and procedures. • Air exceedences are reported to proper authorities in accordance with all applicable laws, regulations and company policies. • Non compliance conditions are corrected and logged in accordance with plant AOP (Air Operating Permit). 	<ul style="list-style-type: none"> • Knowledge of air quality requirements and regulations. • Knowledge of air quality monitoring instrument calibration procedures, policies, laws and regulations. • Knowledge of emissions abatement equipment and applicable maintenance policies and procedures. • Knowledge of AOP. 	<ul style="list-style-type: none"> • Demonstrates honesty and trustworthiness, accepts responsibility for own behavior, analyzes implications of decisions and recommends ethical course of action. • Utilizes integrated software, utilizes networks and manipulates information. • Identifies relevant details, facts, specifications, follows set of instructions and qualifies/analyzes information. • Records information accurately, creates original documents and summarizes information.

Cluster: Combustion Turbine Plant Technician/Specialist
Critical Work Function: G. Perform Administrative Functions

KEY ACTIVITY	Performance Indicators How do we know when the task is performed well?	Technical Knowledge Skills, Abilities, Tools	Employability Skills SCANS Skills and Foundational Abilities
G1. Maintain professional skills	<ul style="list-style-type: none"> • Technical trainings are attended with full participation. • Participation in continuous learning opportunities is optimized. • Equipment instruction manuals are reviewed as required to perform repair, maintenance and installation. • Training needs are communicated and followed up with supervisors. • Baseline knowledge of all categories of equipment in the plant is maintained and kept current. 	<ul style="list-style-type: none"> • Ability to locate schedule and access trainings offered by the organization. • Knowledge of location of equipment instruction manuals and how to use them. • Knowledge of location of materials and information on all categories of equipment in the plant. • Knowledge of process to request new training classes. 	<ul style="list-style-type: none"> • Interprets and applies new knowledge and experience and analyzes application of learning tools. • Identifies relevant details, facts, specifications, follows set of instructions and qualifies/analyzes information. • Records information accurately, creates original documents and summarizes information. • Assists and encourages team members, actively participates, works to improve team skills and demonstrates commitment. • Demonstrates creative thinking process while problem solving; develops creative solutions and applies them to new situations.

KEY ACTIVITY	Performance Indicators How do we know when the task is performed well?	Technical Knowledge Skills, Abilities, Tools	Employability Skills SCANS Skills and Foundational Abilities
G2 Perform as Lead as assigned	<ul style="list-style-type: none"> • Tasks are properly assigned to personnel to meet the needs of the plant and match skills to the job. • Serious violations of performance or conduct are communicated to appropriate manager or supervisor. • Goals for assigned jobs are met. • Work and safety procedures are followed. • Expectations of performance and conduct of personnel are clearly and accurately identified and communicated in the context of assigned jobs. • When appropriate, assignments are made so as to increase familiarity with the plant systems and equipment. • Direction is provided to contractors in an effective manner. • Personnel are mentored and on the job training is provided in an effective manner. • Job planning is comprehensive and executed in an effective manner. 	<ul style="list-style-type: none"> • Knowledge of the plant and equipment, tasks required to operate efficiently, and skills required for tasks. • Knowledge of work and safety procedures. • Knowledge of how systems interrelate and the impact of this interrelationship on plant operations. • Knowledge of the location of equipment in the plant, how the equipment operates and normal and abnormal operating parameters. 	<ul style="list-style-type: none"> • Understands negotiations process, identifies conflicts, demonstrates composure and interprets concerns. • Analyzes situations and information, considers risks and implications, and compiles multiple viewpoints. • Performs routine recordkeeping. • Recognizes job tasks, and distributes and analyzes work assignments. • Adheres to standards, demonstrates commitment to excellence and leads by example. • Understands operation/interaction; manipulates technology for desired result; analyzes technology output; examines task/technology relationship.

KEY ACTIVITY	Performance Indicators How do we know when the task is performed well?	Technical Knowledge Skills, Abilities, Tools	Employability Skills SCANS Skills and Foundational Abilities
G3 Place orders and maintain inventory	<ul style="list-style-type: none"> • Materials needed are accurately identified. • The proper work order is used to create a material request. • Items are requisitioned through computer system, parts department or the parts vendor. 	<ul style="list-style-type: none"> • Knowledge of the materials and parts required for a job. • Knowledge of procedures for work orders and material requests. • Knowledge of how to use computer system, parts department and vendors. • Knowledge of personnel contacts to expedite parts. 	<ul style="list-style-type: none"> • Orders and maintains inventory and monitors safe and efficient utilization of materials. • Performs routine recordkeeping. • Selects data relevant to the task, predicts outcomes, analyzes data and integrates multiple items of data. • Understands negotiations process, identifies conflicts, demonstrates composure and interprets concerns. • Recognizes differences, understands the legal aspects of discrimination, respects the rights of others recognizes the value of diversity. • Establishes rapport with co-workers and customers; modifies behavior to environment; shows understanding for others and encourages cooperation and negotiation.

KEY ACTIVITY	Performance Indicators How do we know when the task is performed well?	Technical Knowledge Skills, Abilities, Tools	Employability Skills SCANS Skills and Foundational Abilities
G4 Write reports as assigned	<ul style="list-style-type: none"> • Written language and diagrams are used when applicable. • Accuracy of analysis is checked. • Purpose of report is clearly understood. • Reports are accurate and completed in a timely manner. 	<ul style="list-style-type: none"> • Knowledge of how systems interrelate and the impact of this interrelationship on plant operations. • Knowledge of the location of equipment in the plant, how the equipment operates and normal and abnormal operating parameters. • Ability to use software programs to develop, distribute and file reports. • Knowledge of information required to meet the requirements of the report. 	<ul style="list-style-type: none"> • Selects data relevant to the task, predicts outcomes, analyzes data and integrates multiple items of data. • Interprets information, transfers information between formats and proposes new processes. • Records information accurately, creates original documents and summarizes information. • Identifies relevant details, facts, specifications, follows set of instructions and qualifies/analyzes information. • Recognizes accuracy of information, interprets information and prepares basic summaries. • Utilizes integrated software, utilizes networks and manipulates information.

INTEGRATION

Assessment and Certification: A Vital Connection

Assessment Strategies

Assessment Design

Assessment and Certification: A Vital Connection

Skill standards, while useful on their own, are just one part of a much larger equation. Skill standards establish the standard of competent performance, but they do not tell a person whether he or she has succeeded in meeting that standard.

For this reason, developing skill standards does not end with their publication. Next steps should include developing voluntary assessments and certifications which will make it possible for students, workers and any interested persons to determine their strengths and weaknesses based on the standards, and to earn certification showing that they can perform work competently as established by the skill standards.

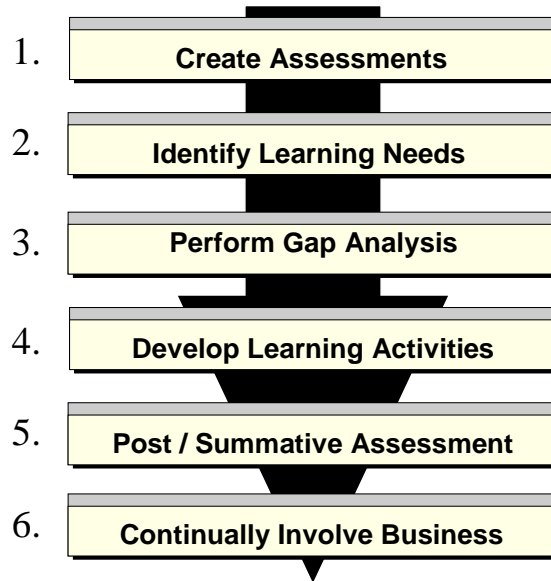
In today's fast-moving technological economy, the necessity for assessments and certification is crucial. The demand for both technical and employability skills are escalating as work becomes more complex. The workforce is more mobile, with workers moving freely between jobs and industries. This job mobility requires that workers must be able to communicate their qualifications to potential employers. They must keep up with technological change through continuous learning and worker retraining, and must be able to prove they have kept pace. All of these factors mean more training and education for individuals, and the ability to show evidence that this training translates to performance on the job.

Voluntary assessments and certifications based on skill standards will help us address all these needs because of the guiding principles upon which skill standards are based, and because of the stakeholders—employers, labor, educators, workers, students, and government—whose needs skill standards are designed to meet.

Please Note: *To ensure the use of standards and their related assessments and certifications do not contradict U.S. employment law, employers will need to conduct an internal validation of the standards before using the skill standards to make hiring and promotion decisions. The purpose of this validation is to ensure that the knowledge, skills and performance described by the standards are needed for competent performance in an employer's organization. The need to validate the standards internally is a key requirement of U.S. employment law, which seeks to protect individuals from discrimination in hiring and promotion.*

A step toward a statewide system of assessments and certifications is the development of assessments which measure an individual's ability to perform work competently as defined by the skill standards. Once these assessments are developed, curriculum can be reviewed to determine that all necessary topics and practicums sufficiently cover the items in the assessment. As gaps are identified, learning activities and content adjustments can be made, and post/summative assessments can be administered. Finally, it is critical that industry be involved every step of the way, and that standards are continuously reviewed and updated. The diagram below provides a summary of this process.

Integrating Skill Standards



Upon completion of the development of skill standards, performance assessment can be created to assess the criteria identified. Sample assessments and standards may be distributed to instructors and curriculum developers who will be educated on the skill standards elements.

Assessments based on the skill standards may include pre-and post-evaluations of the student to measure skill progression and to track the success rate of obtaining certification, where applicable.

Within a skill standards or competency-based system, assessment is the generation and collection of evidence of performance which can be matched to specified explicit standards that reflect expectations of performance in the workplace. There are two main forms of evidence:

- Evidence of actual performance
- Evidence of underpinning knowledge, skills and abilities

The types of evidence may vary and will include:

- Direct evidence (products and items produced by the performer)
- Indirect evidence (supporting evidence and information about the performer)

Evidence can be collected in a wide variety of educational or business settings. To a large extent, the range of opportunities available for demonstration will determine the most appropriate setting. Often it is difficult to actually perform the task in the authentic work setting. In this case, evidence generated during an educational course or an in-house training session can be collected by individuals and added to their overall portfolios.

By requesting that the student or trainee produce tangible results in the form of take-away products (videos, tapes, paper, and electronic products), the participant will have created real evidence which can be shown to human resource personnel, hiring managers, supervisors or assessors. When assessing these products, the trained assessor will seek:

- Validity
- Currency
- Authenticity
- Sufficiency

Therefore, when designing a skill standards-based assessment for an educational course or training session, the assessment process and results will meet four criteria:

Validity: The assessment instrument/process clearly relates to the relevant standards.

Currency: The assessment instrument/process calls for a demonstration of the current standards in the industry.

Authenticity: The individual being assessed produces the assessment results; it is their own work. Team activities will be useful to demonstrate the skills and abilities to work

effectively with others, not necessarily the total end results. The individual can, if possible, identify his or her part of the team project to demonstrate evidence of his or her own results.

Sufficiency: Enough evidence is collected to match the key task and the performance criteria included in the skill standards.

When designing/revising the curriculum for power generation, students will be assisted in generating high-quality evidence of performance or of underpinning skills, knowledge and abilities which will help them to be successfully assessed as fully competent.

Adapted from the *Skill Standards Volume 2: Assessment*, 1999, Washington State Board for Community and Technical Colleges, and *Designing Competency-Based Training*, Shirley Fletcher, 1991, Pfiffer & Company, p. 86-88.

Assessment Design

Type of Authentic Assessment	Description of Authentic Assessment Strategies
Project	<ul style="list-style-type: none"> • Hands-on demonstration of knowledge, skills and attitudes that reveals a student's ability to plan, organize and create a product or an event.
	<ul style="list-style-type: none"> • Documentation of process of development from initial steps to final presentation.
Portfolio	<ul style="list-style-type: none"> • Collection of pieces of evidence of a student's knowledge, skills and attitudes.
	<ul style="list-style-type: none"> • Showcase of best work, work-in-progress.
	<ul style="list-style-type: none"> • Record of student's progress over time.
	<ul style="list-style-type: none"> • Content selection by student in collaboration with the teacher.
	<ul style="list-style-type: none"> • Centerpiece for parent conferences.
On-Demand Demonstrations	<ul style="list-style-type: none"> • Hands-on performance by a student, which illustrates levels of knowledge, skills and attitudes.
	<ul style="list-style-type: none"> • Typically involve a "real life" problem or situation to solve.
	<ul style="list-style-type: none"> • Focus on the application of knowledge and skills learned in one situation as it connects to a new and different one.
Case Studies	<ul style="list-style-type: none"> • Analysis of events and individuals in light of established criteria. • Synthesis of evidence to support generalizations based on individual cases.
Paper/Pencil Tests	<ul style="list-style-type: none"> • Multiple-choice, essay, true-false questions that rely on extended responses to further clarify a student's understanding of the knowledge being assessed.
	<ul style="list-style-type: none"> • Graphic representations that reveal a students' understanding of connections among ideas.
Structured Observation	<ul style="list-style-type: none"> • Observation of events, groups and individuals that focuses on the salient traits of the skill or attitude being observed.
Scenarios	<ul style="list-style-type: none"> • A problematic or challenging situation presented in the context of a career-technical perspective.
	<ul style="list-style-type: none"> • Study required to analyze or evaluate a situation.
	<ul style="list-style-type: none"> • Apply relevant knowledge or skills.
	<ul style="list-style-type: none"> • Prepare and justify a reasonable solution.
Critical Incident	<ul style="list-style-type: none"> • An interview where the assessee is asked to describe past experiences which demonstrate skill standards.

From: Center for Occupational Research and Development, November 1996, and the forthcoming *Skill Standards Volume 2: Assessment*, 1999, Washington State Board for Community and Technical Colleges.

Appendices

References

Ordering Information

References

National Skill Standards Board (2000). Built to Work.

Manufacturing Skill Standards Council (2001). MSSC Skill Standards, A Blueprint for Workforce Excellence.

Washington State Board for Community and Technical Colleges, (1999). Manufacturing Skill Standards.

Washington State Board for Community and Technical Colleges, (Reprinted June, 1999). Skill Standards Guidebook Volumes I and II. See: www.wa-skills.com.

Washington State Board for Community and Technical Colleges, (2002). Transportation Skill Standards.

For more information -- Web references:

<http://www.energycentraljobs.com/>

<http://www.nwppa.org/web/jobs/jobindex.shtml>

<http://www.westernenergy.org/>

<http://energyjobsearch.com/>

<http://www.wa-skills.com/energy.html>

<http://www.power-plant-jobs.com/jobs/index.php?sh+7992&f=1&s=0>

Order Form

For additional copies of *Combustion Turbine Skill Standards*, please detach or photocopy this order form and return it to:

Barbara Hins-Turner
Executive Director
Center of Excellence for Energy Technology
Centralia College
600 W Locust
Centralia, WA 98531-4099
Phone: 360-736-9391, extension 477
bhins-turner@centralia.edu

Payment can be made by check, money order, VISA, MasterCard or purchase order. Checks or money orders should be made payable to Centralia College.

For residents or organizations in the State of Washington, please add sales tax.

Order Form

	Quantity	Cost
<i>Power Generation Skill Standards @ 20.00 each</i>	_____	_____
Washington State Sales Tax (State of Washington only)		_____
Shipping & Handling: <i>Please add \$3.95 for shipping and handling a single order, \$3.95 for each additional item per shipment.</i>		_____
Name	_____	
Address	_____	
City	_____	State _____ Zip _____
<input type="checkbox"/> Check or money order enclosed	<input type="checkbox"/> VISA	<input type="checkbox"/> MasterCard <input type="checkbox"/> Purchase Order
Card Number	_____	Exp. Date _____
PO #	_____	
Signature	_____	