electricity SECTOR COUNCIL

Electrical Power Systems Operator

Profile Outline

Funded by the Government of Canada's Sector Council Program

Canada

This project was funded by the Government of Canada's Sector Council Program
The opinions and interpretations in this publication are those of the author and do not necessarily reflect those of the Government of Canada.

About the Electricity Sector Council

Approximately 100,000 Canadians are involved in the generation, transmission and distribution of one of our country's essential utilities: electricity. Their work powers homes and businesses across the country, fuelling everything from light bulbs, cell phones and refrigerators to water treatment plants and road vehicle assembly lines.

The Electricity Sector Council provides support to this dedicated team by working with industry employers and other stakeholders to research and resolve human resource and workplace development issues.

For more information, contact:

electricity SECTOR COUNCIL
Building bright futures

600 – 130 Slater Street
Ottawa, Ontario K1P 6E2
Tel: (613) 235-5540
Fax: (613) 235-6922
info@brightfutures.ca
www.brightfutures.ca

Electrical Power Systems Operator
Profile Outline

Disclaimer: Please note that some of the tasks detailed in this document will require the services of a registered tradesperson depending upon the province of work. Provincial regulations change from time to time, employers and employees should consult your provincial appropriate licensing authority for clarification regarding which tasks may be affected. It is the responsibility of the individual employer/employee to ensure they act within the regulation for their jurisdiction.

Introduction

Electrical Power Systems Operators monitor and operate switchboards and related equipment in electrical control centres to control the electrical power in transmission, sub-transmission and distribution networks.

The most important Essential Skills for Electrical Power Systems Operators are:

- Document Use
- Numeracy
- Thinking Skills – Critical Thinking

A. Reading Text

Reading Text refers to reading material that is in the form of sentences or paragraphs. *Reading Text* generally involves reading notes, letters, memos, manuals, specifications, regulations, books, reports or journals. *Reading Text* includes:

- forms and labels if they contain at least one paragraph;
- print and non-print media such as computer screen and microfiche text; and
- paragraph-length text within charts, tables and graphs.

The Reading Text Complexity Rating Scale ranges from Level 1 (least complex) to Level 5 (most complex). The typical text reading tasks of Electrical Power Systems Operators are at Complexity Levels 1 to 3. Their most complex text reading tasks are at Complexity Level 3.

Examples

Electrical Power Systems Operators:

- read short comments on report forms. For example, Electrical Power Systems Operators read entries on electricity stoppage or outage report forms. (1)
- may read memos. For example, Electrical Power Systems Operators may read memos that detail administrative matters such as shift responsibilities and reporting duties. (2)
- read e-mail messages on a variety of topics. For example, Electrical Power Systems Operators may read messages from supervisors describing power equipment status, requesting information and notifying them of changes to existing policies or procedures. (2)
- read logs from previous shifts' to locate information about unusual occurrences. For example, Electrical Power Systems Operators may read shift logs which describe load variances and distribution disruptions and the steps taken by operators to alleviate these occurrences. (2)
- read policies and procedures in manuals and handbooks. For example, power systems operators may refer to procedures in regional reliability handbooks to learn about interchange agreements between neighbouring provinces and countries. (2)
- may read trade publications. For example, Electrical Power Systems Operators may read newsletters from the North American Electric Reliability Corporation to learn about reliability standards and their applications in various jurisdictions. (2)
- read reports. For example, Electrical Power Systems Operators may read system condition reports which contain system data about faults, voltages and loads. (3)
- read operating and design manuals for generation or distribution equipment. For example, Electrical Power Systems Operators may read operating manuals for auxiliary equipment to learn how to troubleshoot malfunctions. (3)

Reading Text Summary

Type of Text	Purpose for Reading			
	To scan for specific information/ To locate information	To skim for overall meaning, to get the 'gist'.	To read the full text to understand or to learn.	To read the full text to critique or to evaluate.
Forms	✓	✓		
Labels	✓	✓		
Notes, Letters, Memos	✓	✓	✓	
Manuals, Specifications, Regulations	✓	✓	✓	
Reports, Books, Journals	✓	✓	✓	

B. Document Use

Document Use refers to tasks that involve a variety of information displays in which words, numbers, icons and other visual characteristics (e.g., line, colour, shape) are given meaning by their spatial arrangement. Workplace examples of documents include graphs, lists, tables, blueprints, schematics, drawings, signs and labels.

If a document includes a paragraph of text, as may be the case on a label or a completed form, it is also included in ***Reading Text***. Documents requiring the entry of words, phrases, sentences and paragraphs are also included in ***Writing***.

The Document Use Complexity Rating Scale ranges from Level 1 (least complex) to Level 5 (most complex). The typical document reading tasks of Electrical Power Systems Operators are at Complexity Levels 1 to 4. Their most complex document reading tasks are at Complexity Level 4.

Examples

Electrical Power Systems Operators:

- locate data on labels and tags. For example, they may scan tags on electrical equipment to verify voltages and obtain manufacturers' names and equipment model numbers. They may review labels on equipment to obtain operational and safety data. (1)
- locate data in signs. For example, they may refer to warning signs which describe mandatory personal protective equipment and way-finding signs which depict locations of emergency exits and secure isolation areas. (1)
- locate data in sketches, pictures and icons. For example, Electrical Power Systems Operators may locate icons in supervisory control and data acquisition systems (SCADA) which represent various elements of the electrical system. (2)
- enter data into forms. For example, Electrical Power Systems Operators may complete electricity stoppage or outage report forms by adding quantitative data such as times and dates and by entering concise descriptions of faults. (2)
- recognize common angles. For example, Electrical Power Systems Operators recognize power-factor and load angles. (2)
- may draw to scale. For example, Electrical Power Systems Operators may draw to scale when asked to contribute to the re-designing of control rooms or when completing GIS entries. (2)
- locate data in completed forms. For example, they may review permits and work orders forms completed by maintenance and repair personnel to locate information about the types of repairs required, the locations of the equipment and the durations of the repairs. (2)

- locate data in tables and schedules. For example, Electrical Power Systems Operators may scan shift schedules to determine their work locations and duties. (2)

- may interpret scale drawings. For example, Electrical Power Systems Operators may interpret scale maps of power lines and distribution grids to determine power routing alternatives. (3)

- may interpret schematic drawings of mechanical and electrical systems to understand their operation. For example, Electrical Power Systems Operators may interpret schematic drawings (one-line diagrams) to locate potential causes of outages and shorts. (3)

- locate data and trends in graphs. For example, Electrical Power Systems Operators may refer to graphs that depict electricity consumption within specific areas to ensure optimal power levels. (4)

Examples of Creating Documents

Electrical Power Systems Operators:

- may create equipment repair, equipment overhaul and maintenance schedules to coincide with planned outages.

- may create diagrams. For example, Electrical Power Systems Operators may create diagrams of systems to illustrate routing modifications.

- may create tables and charts to gather, organize and analyze power output and equipment test data for various parameters.

- may create schematic drawings. For example, Electrical Power Systems Operators may create one-line, schematic drawings to visually depict their electrical jurisdictions.

Document Use Summary

Electrical Power Systems Operators:

- Read signs, labels or lists.
- Complete forms by marking check boxes, recording numerical information or entering words, phrases, sentences or texts of a paragraph or more.
- Read completed forms containing check boxes, numerical entries, phrases, addresses, sentences or texts of a paragraph or more.
- Read tables, schedules or other table-like text.
- Create tables, schedules or other table-like text.
- Enter information on tables, schedules or other table-like text.
- Obtain specific information from graphs or charts.
- Interpret information on graphs or charts.
- Construct or draw graphs or charts.
- Recognize common angles such as 15º, 30º, 45º, and 90º.
- Draw, sketch or form common shapes such as circles, triangles, spheres, rectangles, squares, etc.
- Interpret scale drawings (e.g., blueprints or maps).
- Take measurements from scale drawings.
- Draw to scale.
- Read assembly drawings (e.g., those found in service and parts manuals).
- Read schematic drawings (e.g., electrical schematics).
- Create schematic drawings.
- Make sketches.
- Obtain information from sketches, pictures or icons.

C. Writing

Writing includes:

- ***text writing and writing in documents such as filling in forms; and***
- ***non-***paper-based writing such as typing on a computer.

The Writing Complexity Rating Scale ranges from Level 1 (least complex) to Level 5 (most complex). The typical writing tasks of Electrical Power Systems Operators are at Complexity Level 1 to 4. Their most complex writing tasks are at Complexity Level 4.

Examples

Electrical Power Systems Operators:

- write brief reminders and notes to co-workers. For example, they may write notes about shift duties and inspection procedures so that they can remember these details when they eventually write reports. They may write notes to co-workers to remind them of scheduled equipment maintenance and repairs. (1)

- write e-mail messages to co-workers, customers, colleagues and supervisors to request information, coordinate activities and respond to enquiries. (2)

- write entries in log books and shift worksheets. For example, Electrical Power Systems Operators may write descriptions of unplanned outages. (2)

- write reports. For example, Electrical Power Systems Operators may write reports for supervisors which describe conditions leading to unscheduled outages and load inconsistencies. (3)

- may write training materials. For example, experienced Electrical Power Systems Operators may be requested by the training department to author or contribute in the authorship of training materials relating to work processes and procedures that will be used to train new or less-experienced job incumbents. (3)

- may write procedures which describe to other workers exactly how complex job tasks should be performed. For example, Electrical Power Systems Operators may write procedures for initiating tests, outages and shutdowns. (4)

Writing Summary

Length	Purpose for Writing						
	To organize/to remember	To keep a record/to document	To inform/to request information	To persuade/to justify a request	To present an analysis or comparison	To present an evaluation or critique	To entertain
Texts requiring less than one paragraph of new text.	✓	✓					
Texts rarely requiring more than one paragraph		✓	✓				
Longer texts		✓	✓		✓	✓	

D. Numeracy Task

Numeracy refers to the use of numbers by workers and their requirement to think in quantitative terms in order to complete tasks. Two aspects of ***Numeracy*** have complexity ratings: *Numerical Calculation;* and, *Numerical Estimation*.

Numerical Calculation is rated within four different application settings as specific knowledge of concepts or procedures are exclusive to each setting:

- ***Money Math*** - financial transactions, such as handling cash, preparing bills or making payments;
- ***Scheduling or Budgeting and Accounting Math*** - managing time and money as resources, planning and monitoring their use, assessing best value, reducing waste;
- ***Measurement and Calculation Math*** - measuring and describing the physical world; and,
- ***Data Analysis Math*** - analysis of numerical data such as extrapolation of information and determination of trends or statistically significant effects.

Numerical Estimation refers to tasks involving any estimation (i.e., an approximation based on judgement) that results in a number.

Numerical Calculation

The Numerical Calculation Rating Scale ranges from Level 1 (least complex) to Level 5 (most complex). The numerical calculation tasks of Electrical Power Systems Operators involve:

- Money Math at Complexity Level 2.
- Scheduling or Budgeting and Accounting Math at Complexity Levels 2 to 4.
- Measurement & Calculation Math at Complexity Levels 1 to 3.
- Data Analysis at Complexity Levels 2 to 3.

Examples

Electrical Power Systems Operators:

- may total amounts for parts on requisition forms. For example, they may request replacement parts such as valves and switches and note the costs associated with the replacements for accounting staff. (Money Math) (2)

- may calculate amounts for travel expense reimbursements. They calculate amounts for travel in personal vehicles using per kilometre rates. They may add amounts for per diem allowances and meals. (Money Math) (2)

- prepare schedules. For example, they prepare equipment testing, inspecting and maintenance schedules and may organize crew assignments and complex outage and power distribution, transmission and generation schedules. (Scheduling or Budgeting and Accounting Math) (2)

- arrange and monitor complex schedules which identify activities and target completion times for generator and reactor shutdowns, planned power outages and major maintenance of power generating and distributing equipment. They must ensure that utility customers and transmission networks are notified in advance of these activities and that power is restored to service areas as originally scheduled. (Scheduling or Budgeting and Accounting Math) (4)

- measure physical properties using common measuring tools and gauges. For example, they may measure liquid volumes using graduated cylinders and measure temperatures and pressures using gauges on equipment. (Measurement and Calculation Math) (1)

- calculate dimensions using measurements of scale drawings. For example, power systems operators may measure scale distances on maps of power service and transmission areas to obtain the actual distances between generation and distribution stations and power lines. (Measurement and Calculation Math) (2)

- may calculate amperages, line voltages and resistances using Ohm's law. (Measurement and Calculation Math) (3)

- compare measurements and equipment readings to specifications. For example, power systems operators record equipment temperatures, pressures and other data on a variety of equipment and operating systems and compare the data to operating norms. They determine if the equipment is operating within acceptable ranges and use their analysis to identify the need for recalibration and repair. (Data Analysis Math) (2)

- record and analyze quantitative data. For example, Electrical Power Systems Operators may compare amounts of electricity coming into systems to amounts of electricity going out to assess load scheduling and adjust power distribution or transmission. (Data Analysis Math) (3)

Numerical Estimation

The Numerical Estimation Rating Scale ranges from Level 1 (least complex) to Level 4. The numerical estimation tasks of Electrical Power Systems Operators are at Complexity Level 2.

- estimate how long various maintenance and repair tasks may take. For example, they may estimate how long it will take to shut down, diagnose, repair and re-commission power generating and distribution equipment. They may refer to previous examples of similar maintenance tasks to inform their estimates. (Numerical Estimation) (2)

- may estimate output requirements. For example, Electrical Power Systems Operators may create load shift forecasts by estimating electrical output requirements for numbers of days in advance. (Numerical Estimation) (2)

Math Skills Summary

a) Mathematical Foundations Used

Number Concepts	
Whole Numbers	Read and write; count; round off; add or subtract; multiply or divide whole numbers. For example, reading or writing the number of generators that are operational; counting maintenance crews; calculating distances travelled for expense claims.
Integers	Read and write; add or subtract; multiply or divide integers. For example, reading and writing temperatures; monitoring and reporting water or electricity flow changes.
Rational Numbers – Fractions	Read and write; add or subtract fractions; multiply or divide by a fraction; multiply or divide fractions. For example, reading and writing sizes of parts in fractions of inches; adding fractions of hours when calculating the time needed to complete various steps of procedures.
Rational Numbers - Decimals	Read and write; round off; add or subtract decimals; multiply or divide by a decimal; multiply or divide decimals. For example, interpreting readings expressed as decimals; calculating generation outputs.

Rational Numbers - Percent	Read and write percents; calculate the percent one number is of another; calculate a percent of a number. For example, interpreting water levels expressed as percentages; calculating operating output of generating equipment in percentages of total capacities.
Equivalent Rational Numbers	Convert between fractions and decimals or percentages. Convert between decimals and percentages. For example, expressing power distribution and output as fractions or percentages of total capacities; converting between percentages and decimals when reading pressure data on gauges.
Other Real Numbers	Use powers and roots; scientific notation; significant digits. For example, using significant digits when determining large generation outputs, such as megawatts and gigawatts.

Patterns and Relations	
Equations and Formulae	Solve problems by constructing and solving equations with one unknown. Use formulae by inserting quantities for variables and solving. For example, calculating Vars and amperages; inserting quantities into Ohm's Law formulae to calculate current, electrical potential and resistances.
Use of Rate, Ratio and Proportion	Use a rate showing comparison between two quantities with different units. Use a ratio showing comparison between two quantities with the same units. For example, reading and writing water flow rates in cubic metres per second or cubic feet per second; calculating distances from scale maps of power lines using scaling ratios; using ratios to route power to substations or transmission lines.
See Document Use for information on using scale drawings	

Shape and Spatial Sense	
Measurement Conversions	Perform measurement conversions. For example, converting pressure measurements in pounds per square inch to kilopascals.
Areas, Perimeters, Volumes	Calculate areas. Calculate perimeters. Calculate volumes. For example, calculating areas and perimeters of control rooms; calculating liquid

	volumes of storage tanks.
Trigonometry	Use trigonometry. For example, using trigonometric formulae to calculate load angles and power factors.
See Document Use for information on recognizing common angles and drawing, sketching and forming common forms and figures.	

Statistics and Probability	
Summary Calculations	Calculate averages. Calculate rates other than percentages. Calculate proportions or ratios. For example, calculating average times of maintenance and repair tasks; calculating average electricity consumption over periods of time; calculating distribution factors for lines; calculating limited time ratings for equipment.
Statistics and Probabilities	Use descriptive statistics (e.g., collecting, classifying, analyzing and interpreting data). Use inferential statistics (e.g. using mathematical theories of probability, making conclusions about a population or about how likely it is that some event will happen). For example, collecting and analyzing power consumption data to determine seasonal trends; collecting weather data to predict load patterns.
See Document Use for information on using tables, schedules or other table-like text and using graphical presentations.	

How Calculations Are Performed

- In their heads
- Using a pen and paper
- Using a calculator
- Using a computer

Measurement Instruments Used

- **Time** – For example, using clocks and watches.
- **Weight or mass** – For example, using scales.
- **Distance or dimension** – For example, using measuring tapes and rulers.
- **Liquid volume** – For example, using graduated cylinders.
- **Temperature** – For example, using thermometers.
- **Pressure** – For example, using gauges.
- **Electrical Potential (Volt)** – For example, using voltmeters.
- **Wattage** – For example, using kilowatt meters.
- **Amperage** – For example, using ammeters.

They use the:

- System International (Metric) measuring system, and
- Imperial measuring system

E. Oral Communication

Oral Communication pertains primarily to the use of speech to give and exchange thoughts and information.

The Oral Communication Complexity Rating Scale ranges from Level 1 (least complex) to Level 4 (most complex). The typical oral communication tasks of Electrical power systems operators are at Complexity Levels 1 to 4. Their most complex oral communication tasks are at Complexity Level 4.

Examples

Electrical Power Systems Operators:

- may discuss matters such as products, prices and delivery times with suppliers and purchasing and accounting personnel. (1)
- discuss ongoing work with co-workers. For example, they may confirm job tasks with other operators of upcoming shifts. They may obtain guidance and approvals from and discuss performance targets and work assignments with supervisors. (2)
- discuss matters such as the current status of generation or transmission systems, policy and procedure changes, health and safety hazards, test results and upcoming equipment repairs with other operators and supervisors at meetings. They may be asked to present pertinent procedures they have developed or reports they have written. (2)
- discuss the technical aspects of work assignments and unusual job tasks with co-workers and colleagues. For example, they may consult mechanics, millwrights, power electricians and electrical engineers to discuss processes, procedures and standards and to learn how to analyze anomalous equipment data. (3)
- interact with co-workers, colleagues and customers to coordinate job tasks and power transactions. For example, Electrical Power Systems Operators interact with power station operators to ensure enough power is being generated to meet distribution demands. (4)

Modes of Communication Used

- **In person** – For example, asking supervisors for work protection permits.
- **Using a telephone** – For example, speaking with operators in off-site stations by telephone to obtain information.
- **Using a two-way radio** – For example, speaking with maintenance staff in the field with two-way radios.

Environmental Factors Affecting Communication

Electrical Power Systems Operators working in control rooms are faced with audible and visual distractions, such as other operators, multiple screens and alarms, which impact their ability to effectively communicate with other personnel. Poor control room design can also impact the operators' abilities to effectively communicate with their fellow operators and field personnel.

Oral Communication Summary

Type	Purposes of Oral Communication (Part 1)					
	To greet	To take messages	To provide/ receive information, explanation, direction	To seek, obtain information	To co-ordinate work with that of others	To reassure, comfort
Interact with co-workers			✓	✓	✓	
Interact with supervisor/ manager			✓	✓	✓	
Interact with peers and colleagues from other organizations			✓	✓	✓	
Interact with customers/clients /public			✓		✓	
Interact with suppliers, servicers			✓		✓	
Participate in group discussion			✓	✓	✓	
Present information to a small group			✓			

Type	Purposes of Oral Communication (Part 2)					
	To discuss (exchange information, opinions)	To persuade	To facilitate, animate	To instruct, instil under-standing, knowledge	To negotiate, resolve conflict	To entertain
Interact with co-workers	✓					
Interact with supervisor/ manager	✓					
Interact with peers and colleagues from other organizations	✓					
Interact with customers/ clients/public	✓			✓		
Interact with suppliers, servicers	✓					
Participate in group discussion	✓					
Present information to a small group	✓			✓		

F. Thinking Skills

Thinking Skills differentiate among five different types of cognitive functions. However, these functions are interconnected and include:

1. ***Problem Solving***
2. ***Decision Making***
3. ***Critical Thinking***
4. ***Job Task Planning and Organizing***
5. ***Significant Use of Memory***
6. ***Finding Information***

1. Problem Solving

Problem solving involves problems that require solutions. For example, a mechanic solves problems, e.g., the car shakes when driven over 80 km./hr., by eliminating probable causes until the correct one is identified and remedied. Most problems concern mechanical challenges, people or situations.

The Problem Solving Complexity Rating Scale ranges from Level 1 (least complex) to Level 4 (most complex). The typical problem solving tasks of Electrical Power Systems Operators are at Complexity Levels 2 to 3. Their most complex problem solving tasks are at Complexity Level 3.

Examples

Electrical Power Systems Operators:

- encounter distribution and generation equipment failures which present safety hazards and imminent system failures. They discuss these issues with fellow operators and personnel, try to diagnose and isolate potential causes of failures and faults and notify other workers in the areas of the failures. They contact maintenance staff to schedule repairs and replacements. (2)
- cannot complete inspection and maintenance tasks because instructions on work permits and shift logs are missing and unclear. They may contact co-workers of previous shifts and supervisors to verify job tasks and schedules. (2)
- encounter capacity problems in power distribution, transmission and generation systems. For example, they may find that the output capacities of electrical substations are exceeded because the demand for electricity is too high. They may collect operating data of equipment to identify immediate solutions such as boosting output and routing additional power to meet the demand. (2)
- detect patterns of skewed and distorted equipment output data. For example, power systems operators may identify discrepancies between gauges and data projected by supervisory control and data acquisition system computer screens. (3)

2. Decision Making

Decision making refers to making a choice among options.

Decision making occurs during problem solving, but not all decision making is part of problem solving. It is, therefore, presented as a separate thinking skill. For example, buyers for retail outlets regularly make decisions about which suppliers to buy from, i.e., they select from the options for particular types of merchandise. This is not problem solving.

The Decision Making Complexity Rating Scale ranges from Level 1 (least complex) to Level 4 (most complex). The typical decision making tasks of Electrical Power Systems Operators, are at Complexity Levels 2 to 4. Their most complex decision making tasks are at Complexity Level 4.

Examples

Electrical Power Systems Operators:

- decide which repair and maintenance tasks they are able to complete. They consider their personal technical skills, repair and maintenance experience with similar equipment and their ability to complete repairs within timeframes allowed for scheduled tasks. (2)

- choose procedures and specifications to apply when inspecting equipment and creating work protection permits. For example, they may review current commissioning procedures for power lines, pumps and auxiliary equipment and refer to past work protection permits to decide which procedures to follow. (2)

- may decide to recommend adjustments, repairs and replacements of power system equipment. For example, Electrical Power Systems Operators may decide to propose software and hardware upgrades to supervisory control and data acquisition systems. (3)

- decide to shut down electrical equipment because of faults, malfunctions and anomalous data. They consider the potential causes of the failures and review potential hazards to co-workers and the environment. They base their decisions on the severity of possible risks such as customer backlash, dangerous emissions or leaks and heavy penalties against their employers. (4)

3. Critical Thinking

Critical Thinking is the process of evaluating ideas or information, using a rational, logical thought process, and referring to objective criteria, to reach a rational judgement about value, or to identify strengths and weaknesses.

Critical Thinking may be an element in other thinking skills. For example, judgement is sometimes required to evaluate the choices offered during the course of ***Decision Making*** and to evaluate solutions proposed as a result of ***Problem Solving***. In other cases, Critical Thinking is an independent job task.

The Critical Complexity Rating Scale ranges from Level 1 (least complex) to Level 4 (most complex). The typical critical thinking tasks of Electrical Power Systems Operators are at Complexity Levels 2 to 3. Their most complex critical thinking tasks are at Complexity Level 3.

Examples

Electrical Power Systems Operators:

- assess the safety of workplaces and work processes. To assess potential risks, they review previous work orders, permits, work protections and associated reports to see if hazards have been reported. They may verify details with safety personnel and supervisors. (2)

- evaluate the appropriateness of scheduled maintenance and planned power outages. They consider the availability of maintenance crews and consider consumers' demands for continued service. They identify possible financial ramifications of shutting power down within service areas for specified periods of time and try to limit negative effects of outages such as prolonged disruption of service. (3)

- judge the quality and veracity of electrical system data. To confirm that data is sufficient and accurate, they may conduct equipment tests and diagnostics, compare test results to data from previous tests, ask co-workers for opinions and read manuals and specifications. (3)

- may assess the completeness and quality of repairs to electrical system equipment by mechanical and electrical maintenance crews. For example, they may review work orders to verify that appropriate maintenance tasks have been performed. They may test equipment after repairs to determine if equipment is functioning correctly and visually inspect work areas to ensure re-commissioning is complete. (3)

4. Job Task Planning and Organizing

There are two aspects to ***Planning and Organizing: Job Task Planning and Organizing*** and ***Organizational Planning***.

Job Task Planning and Organizing refers to the extent to which the workers plan and organize their own tasks.

Organizational Planning refers to the job incumbent's involvement in the organization's broader planning and organizing tasks (i.e., planning and organizing the work of others, operational planning, strategic planning).

The Job Task Planning and Organizing Rating Scale ranges from Level 1 (least complex) to Level 4 (most complex). Electrical Power Systems Operators plan and organize their job tasks at Complexity Level 3.

Own Job Planning and Organizing

Electrical Power Systems Operators are required to complete sets of routine tasks within their shifts to ensure adherence to operational standards. They are able to prioritize their tasks by responding to immediate demands in the midst of completing scheduled duties. Their work may be interrupted by unpredictable factors such as equipment breakdowns, communication errors, shortages of maintenance crews, unplanned outages, storms, floods and other emergencies. They must be able to react quickly to situations as they arise and reschedule and reorganize job tasks. (3)

Planning and Organizing for Others

Electrical Power Systems Operators may plan job tasks for mechanical and electrical maintenance crews in emergency situations

5. Significant Use of Memory

Significant Use of Memory includes any significant or unusual use of memory for workers in the occupational group. It does not include normal memory use that is a requirement for every occupation.

Examples

Electrical Power Systems Operators:

- remember acceptable ranges of values for temperatures, fluids, pressures and other readings of the equipment and systems they operate.
- remember mathematical formulae to complete common calculations.
- remember procedures and protocols to use when inspecting, operating and testing electrical system equipment.

6. Finding Information

Finding Information involves using any of a variety of sources including text, people, computerized databases or information systems.

Finding Information is highlighted in this section as an essential job skill. However, workers' use of various information sources may be referred to in other sections such as *A. Reading Text, B. Use of Documents, E. Oral Communication* and *H. Computer Use*.

The Finding Information Complexity Rating Scale ranges from Level 1 (least complex) to Level 4 (most complex). Electrical Power Systems Operators, tasks that involve finding information are at Complexity Level 2.

Examples

Electrical Power Systems Operators:

- may find information about company and corporate policies and procedures on an intranet or internal computer network. (2)
- find information by asking fellow operators and tradespeople. 92)
- find information in control room resource libraries. (2)
- find information about governing regulations such as the *Environmental Protection Act* and *Occupational Health and Safety Act.* (2)
- find information about past equipment maintenance and repairs in shift logs, permits and schedules. (2)

G. Working with Others

The Essential Skill of ***Working with Others*** examines the extent to which employees work with others to carry out their tasks. Do they have to work co-operatively with others? Do they have to have the self-discipline to meet work targets while working alone?

The Working with Others Complexity Rating Scale ranges from Level 1 (least complex) to Level 4 (most complex). Electrical Power Systems Operators, work with others at Complexity Level 3.

Description

Electrical Power Systems Operators work as members of integrated teams. They control systems to manage the flow of power throughout transmission networks by maintaining contact with power station personnel to ensure adequate generation of power to meet demands. They communicate regularly to regulate and co-ordinate transmission loads, frequencies and line voltages. They also co-ordinate their work with that of electrical and mechanical maintenance personnel to locate system problems, issue work orders and assist in system testing. Electrical Power Systems Operators work independently to review documents, complete reports and inspect equipment. (3)

Participation in Supervisory or Leadership Activities

Electrical Power Systems Operators:

- participate in formal discussions about work processes or product improvement.
- have opportunities to make suggestions on improving work processes.
- monitor the work performance of others.
- inform other workers or demonstrate to them how tasks are to be performed.
- orient new employees.
- make hiring recommendations.
- make hiring decisions.
- assign routine tasks to other workers.
- assign new or unusual tasks to other workers.
- identify training that is required by, or would be useful for, other workers.

H. Computer Use

> ***Computer Use*** indicates the variety and complexity of computer use within the occupational group

The Computer Use Rating Scale ranges from Level 1 (least complex) to Level 5 (most complex). The Computer Use tasks of Electrical Power Systems Operators, are at Complexity Levels 2 and 3.

Examples

Electrical Power Systems Operators:

- use word processing software. For example, they may use desktop publishing features of Word to write, edit and format reports, procedures, permits and other documents. (2)
- may use database software. For example, Electrical Power Systems Operators may access corporate customer information to determine power routing demands. (2)
- may use spreadsheet software. For example, Electrical Power Systems Operators may enter quantitative data into spreadsheets to track the flows of electrical power in transmission networks. (3)
- may use statistical analysis software. For example, Electrical Power Systems Operators may use specialized statistical analysis software to complete contingency analyses to assess the risk of certain contingencies to the electrical networks. (3)
- may use computer-assisted design software. For example, Electrical Power Systems Operators may use AutoCAD to create schematic drawings and to make field marks for drawings revisions to be completed by the drafting department. (3)
- may use communication software. For example, they may use communication software to create and maintain contact lists, send and receive e-mail messages and retrieve attachments from supervisors and co-workers. They may relay information to field crews via their personal digital assistants or cellular telephones. (3)
- may use the Internet. For example, Electrical Power Systems Operators may enter keywords in Internet search engines to learn about electrical generating stations and equipment. (2)
- use other computer and software applications. For example, they use supervisory control and data acquisition systems to monitor, adjust and assess systems' operational status. (3)

I. Continuous Learning

Continuous Learning examines the requirement for workers in an occupational group to participate in an ongoing process of acquiring skills and knowledge.

Continuous Learning tests the hypothesis that more and more jobs require continuous upgrading, and that all workers must continue learning in order to keep or to grow with their jobs. If this is true then the following will become Essential Skills:

- knowing how to learn;
- understanding one's own learning style; and
- knowing how to gain access to a variety of materials, resources and learning opportunities.

The Continuous Learning Complexity Rating Scale ranges from Level 1 (least complex) to Level 4 (most complex). Electrical Power Systems Operators perform Continuous Learning tasks at Complexity Level 3.

Description

Electrical Power Systems Operators are required to continually update their skills and knowledge to keep up with changes in technology and safety regulations. They learn daily by talking to co-workers and reading information found in company reports, operational and procedural manuals, websites and trade publications. Electrical Power Systems Operators who manage international power grids and nuclear operators may be required to write exams to obtain certification through government agencies, industry associations and sector organizations. They may be required to develop their own learning plans and attend courses addressing new equipment operations, spill management procedures or health and safety issues, such as first aid, isolation, confined spaces or dangerous goods transportation. (3)

How Learning Occurs

- as part of regular work activity.
- from co-workers.
- through training offered in the workplace.
- through reading or other forms of self-study:
  - at work,
  - on worker's own time,
  - using materials available through work,
  - using materials obtained through a professional association or union,
  - using materials obtained on worker's own initiative.
- through off-site training:
  - during working hours at no cost to the worker,
  - partially subsidized,
  - with costs paid by the worker

J. Other Information

Other Information summarizes additional information collected during interviews with job incumbents and focus groups with occupational experts.

In addition to collecting information for this Essential Skills Profile, our interviews with job incumbents also asked about the following topics.

1. Physical Aspects

Electrical Power Systems Operators sit and stand at computerized control centres. They use upper limb and hand-eye coordination to manipulate computer hardware and use multiple limb coordination to inspect, operate and calibrate distribution, transmission and generation equipment. Some operators may be required to exert strength to complete equipment repairs and maintenance. Electrical Power Systems Operators who work in control rooms spend eight to twelve hour shifts seated in front of computer banks. Remaining seated for prolonged periods of time can result in back problems and increase the risk of sedentary health conditions, such as blood clots in the legs. They must be able to interpret frictional sounds associated with malfunctioning or non-functioning equipment and be aware of visual signs of equipment failures such as leaks or flashing lights.

2. Attitudes

Electrical Power Systems Operators must be patient, focused, flexible and able to react quickly in crisis situations. They must demonstrate motivation and persistence to solve problems and must possess good communication skills to be able to work effectively as part of a team.

3. Future Trends Affecting Essential Skills

In the future, Electrical Power Systems Operators will need well-developed critical thinking, problem solving and computer skills to successfully use automated distribution, transmission and generation technologies. They will be required to think critically and will require more extensive problem solving skills to identify and troubleshoot faults and anomalies using these technologies. They will require more extensive computer use skills to understand the operation of advancing supervisory control and data acquisition systems.

electricity
SECTOR COUNCIL

www.brightfutures.ca