



ONTARIO COLLEGE OF TRADES
ORDRE DES MÉTIERS DE L'ONTARIO

Apprenticeship Training Standard

Schedule of Training

Process Operator Refinery, Chemical and Liquid Processes

Trade Code: 246F

Development Date: May 2000

PROCESS OPERATOR – REFINERY, CHEMICAL AND LIQUID PROCESSES

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PREFACE

This Schedule of Training was developed by the Workplace Training Branch of the Ministry of Training, Colleges, and Universities (MTCU), in partnership with the Industry Advisory Committee and in consultation with representatives from the industry. This document is intended to be used by apprentice, supervisor/trainer and sponsor/employer as a "blueprint" for training and as a prerequisite for completion and certification.

This training document becomes the apprentice's only record of workplace training performance.

Supervisor/trainer and apprentice are required to sign off and date the skills following each successful acquisition, unless a skill is marked shaded (optional).

The care and maintenance of this training document are the joint responsibility of the apprentice and the sponsor/employer. By signing off the skill, the supervisor/trainer and the apprentice are indicating that the apprentice has demonstrated competence of the skill. This training standard has been developed specifically for documenting the apprentice's acquisition of skills of the trade.

Please Note: Apprenticeship Training and Curriculum Standards were developed by the Ministry of Training, Colleges and Universities (MTCU). As of April 8th, 2013, the Ontario College of Trades (College) has become responsible for the development and maintenance of these standards. The College is carrying over existing standards without any changes.

However, because the Apprenticeship Training and Curriculum Standards documents were developed under either the Trades Qualification and Apprenticeship Act (TQAA) or the Apprenticeship and Certification Act, 1998 (ACA), the definitions contained in these documents may no longer be accurate and may not be reflective of the Ontario College of Trades and Apprenticeship Act, 2009 (OCTAA) as the new trades legislation in the province. The College will update these definitions in the future.

Meanwhile, please refer to the College's website (<http://www.collegeoftrades.ca>) for the most accurate and up-to-date information about the College. For information on OCTAA and its regulations, please visit: <http://www.collegeoftrades.ca/about/legislation-and-regulations>

DEFINITIONS

ACA

Apprenticeship and Certification Act, 1998

Certificate of Apprenticeship (C of A)

Certification issued to individuals who have demonstrated that they have completed an apprenticeship in Ontario.

Certificate of Qualification (C of Q)

Certification issued to C of Q applicants who have achieved a passing grade on the certification exam for their trade.

Competence

The ability of an individual to perform a skill repeatedly and without assistance in the workplace to the standard set out in the Training Standard or Schedule of Training.

Competency Analysis Profile

A document that identifies the training needs of an individual trade and details the skills/skill sets that must be demonstrated.

Industry Committee (IC) - under the ACA and Provincial Advisory Committee (PAC) under the TQAA

Under the ACA and TQAA, the Minister may appoint a provincial committee in any trade or group of trades to advise the Minister in matters relating to the establishment and operation of apprenticeship training programs and trades qualifications.

Journey person or Equivalent

A person who has acquired the knowledge and skills in a trade, occupation or craft as attested to by a provincial or territorial authority.

Mandatory

Status assigned to unshaded individual skills, skill sets or general performance objective which must be signed off for the apprentice to complete their program.

Optional

Status assigned to shaded individual skills, skills sets or general performance objective for which sign-off is not required for the apprentice to complete the program.

Schedule of Training

An apprenticeship training standard which includes the on-the-job performance objectives and off-the-job learning outcomes

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Sign-off

Signature of the sponsor/employer of record or an individual, to whom that sponsor or employer has delegated signing authority, indicating an apprentice's achievement of competence.

Skill

Individual skill described in the Training Standard (note: does not mean the larger skill groups referred to in the Training Standard as Skill Sets, Training Units, or General Performance Objective, but the individual skills that make up those groups).

Skill Sets

Group of individual skills found in the Training Standard (may also be called Training Unit or General Performance Objective)

Skill Set Completion Form (and Learning Outcome Completion Form)

Lists all skill sets and includes space for sign-off by sponsor/employer of record.

Sponsor/Employer

Means a person that has entered into a registered training agreement under which the person is required to ensure that an individual is provided with workplace-based training in a trade, other occupation or skill set as part of an apprenticeship program approved by the Director.

Sponsor/Employer of Record

Refers to the sponsor or employer documented as the signatory to the current training agreement or contract. In order for a sponsor/employer to be considered for the training of apprentices, they must identify that the workplace has qualified journeypersons or equivalent on site and can identify that the workplace has the tools, equipment, materials, and processes which have been identified by Provincial Advisory Committees (PACs) or Industry Committees (ICs) to be required for the trade.

Supervisor

An individual who oversees the execution of a task or oversees the actions or work of others.

Trainer

A qualified trainer in a compulsory trade is a journeyperson with a Certificate of Qualification or in a voluntary trade is an individual who is considered equivalent to a journeyperson with a Certificate of Qualification.

TQAA

Trades Qualification and Apprenticeship Act.

Training Standard

A document that has been written in concise statements which describe how well an apprentice must perform each skill in order to become competent. In using the document, trainers will be able to ensure that the apprentice is developing skills detailed for the occupation.

IMPORTANT DIRECTIONS

Apprentice

1. All complete skills or skill sets must be signed and dated by both the apprentice and sponsor/employer when either all terms of the contract have been completed or the apprentice leaves the employ of the employer.
2. It is the responsibility of the apprentice to inform the local Apprenticeship Client Services Office regarding the following changes:
 - change of sponsor/employer address;
 - change of apprentice name or address;
 - transfer to a new sponsor/employer.
3. The Skill Set Completion Form and Learning Outcome Completion Form must be completed and signed by the current sponsor/employer and presented to the local Apprenticeship Client Services Office at the fulfillment of all terms of a Training Agreement.
4. The apprentice completion form with the Completed and Authorized Schedule of Training must be presented to the local Apprenticeship Client Services Unit.

Sponsors/Employers and Supervisors/Trainers

The Schedule of Training identifies skills and supporting learning outcomes required for this trade/occupation and its related training program.

This Schedule of Training has been written in concise statements which describe how an apprentice must perform each skill/outcome in order to become competent. Competence means being able to perform the task to the required standard.

In using this training standard, supervisors/trainers will be able to ensure that the apprentice is developing the skills detailed for the trade/occupation.

Supervisors/Trainers and apprentices are required to sign off and date the skills following each successful acquisition.

Sponsors/Employers participating in this training program will be designated as the Signing Authority and are required to attest to successful achievement by signing the appropriate box included at the end of each skill set.

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NOTICE OF COLLECTION OF PERSONAL INFORMATION

1. At any time during your apprenticeship training, you may be required to show this training standard to the Ministry of Training, Colleges and Universities (the Ministry). You will be required to disclose the signed Apprenticeship Completion form to the Ministry in order to complete your program. The Ministry will use your personal information to administer and finance Ontario's apprenticeship training system, including confirming your completion and issuing your certificate of apprenticeship.
2. The Ministry will disclose information about your program completion and your certificate of apprenticeship to the Ontario College of Trades, as it is necessary for the College to carry out its responsibilities.
3. Your personal information is collected, used and disclosed by the Ministry under the authority of the Ontario College of Trades and Apprenticeship Act, 2009.
4. Questions about the collection, use and disclosure of your personal information by the Ministry may be addressed to the:

Manager, Employment Ontario Contact Centre
Ministry of Training, Colleges and Universities
33 Bloor St. E, 2nd floor, Toronto, Ontario M7A 2S3
Toll-free: 1-800-387-5656; Toronto: 416-326-5656
TTY: 1-866-533-6339 or 416-325-4084.

**ROLES & RESPONSIBILITIES OF APPRENTICE, SPONSOR/EMPLOYER
AND SUPERVISOR/TRAINER**

Apprentice “Apprenticeship is Learning On-the-job”

- Practice safe work habits.
- Use your apprenticeship training standard as a journal to keep track of which skills you have achieved.
- Talk over your training plan with your Training Consultant, Employer, Union, or Sponsor.
- Know what tools are required for your trade and how to use them.
- Ask questions and keep asking.
- Talk to your employer about your training needs.
- Demonstrate enthusiasm and good work habits.
- Ensure that you and your supervisor/trainer sign off skill/skill sets upon demonstration of competency.

Sponsor/Employer “Training is an Investment”

- Demonstrate safe work habits.
- Attest to successful achievement by signing the skill/skills sets.
- Provide opportunities and time for the apprentice to learn the trade.
- Offer practical trade training experiences that cover all of the skill sets.
- Foster work ethics that support training while minimizing productivity losses.
- Set out clear expectations, then recognize or reward performance excellence.
- Involve both the apprentice and supervisor/trainer in developing the training plan.
- Use the Training Standard as a monitoring tool and part of regular performance evaluations.
- Select supervisors/trainers with good communication skills and who work well with others.
- Encourage supervisors/trainers to take upgrading courses - (e.g. Train the Trainer, Mentor Coach, etc).
- Complete the Skill Set Completion Form once the apprentice has demonstrated competency in the training.
- Ensure that the apprentice always works under the direction of or has access to a qualified supervisor/trainer.
- Vary the apprentice’s exposure to all the skills set out in the training standard.

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Supervisor/Trainer

- Demonstrate safe work habits.
- Treat apprentices fairly and with respect.
- Use the Training Standard as a guide to evaluating competence in each skill area. In using the Training Standard, supervisors/trainers will be able to ensure that the apprentice is developing skills detailed for the trade/occupation.
- Review the Training Standard with the apprentice and develop a training plan.
- Respond fully to all questions.
- Be patient. Explain what is to be done then, show how it is done, and then let the apprentice demonstrate the task.
- Provide continuous feedback.
- Sign off individual skills/skill sets once the apprentice demonstrates competence in the skill.

Suggestions for Assessing the Progress of the Apprentice in the Workplace

- Use informal daily observation.
- Provide constructive feedback to build confidence.
- Allow the supervisor/trainer time to teach and demonstrate the skills.
- Take prompt action wherever problems occur.
- Conduct regular performance reviews involving the apprentice, supervisor/trainer and sponsor/employer.
- Use the Training Standard as the reference for establishing the competency of the apprentice.

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SKILL SET COMPLETION FORM

SKILLS SETS	TITLE	SIGNING AUTHORITY
246F1.0	Demonstrate safe working practices and procedures	
246F2.0	Employ job information resources	
246F3.0	Use and maintain tools and equipment	
246F4.0	Operate a central control room	
246F5.0	Control process operations	
246F6.0	Monitor outside process equipment	
246F7.0	Control process materials	
246F8.0	Operate process equipment	
246F9.0	Maintain vessels	
246F10.0	Control chemical composition	
246F11.0	Maintain equipment	
246F 12.0	Carry out statistical process control	

NOTE ON SHADED PERFORMANCE OBJECTIVES AND SKILLS:

- Shaded performance objectives and skill sets are optional. The shaded skills do not have to be demonstrated or signed-off for completion of the on-the-job component of the apprenticeship
- The learning outcomes will cover all of the skill sets, both shaded and unshaded.

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LEARNING OUTCOMES COMPLETION FORM

Date of Completion	Organization Name(s)	SIGNING AUTHORITY

APPRENTICE COMPLETION FORM

APPRENTICE NAME	
Print	
Signature	
Social Insurance Number	

Skill Sets and Learning Outcomes when completed should be signed by the Supervisor/Trainer and presented with this completion form to your local Apprenticeship Client Services Office. Any supporting documentation should also be attached.

In-school Completed Yes () No () Not applicable ()
(Proof to be provided)

Hours completed as
Per Contract: Yes () No () Not applicable ()

SPONSOR/EMPLOYER INFORMATION	
Name	
Address	
Telephone	
E-mail Address	
Signature of Signing Authority	

You will be required to disclose this signed form to the Ministry of Training, Colleges and Universities in order to complete your program. The Ministry will use your personal information to administer and finance Ontario's apprenticeship training system. For further information please see the notice/declaration for collection of personal information that is referenced in the table of contents of this training standard.

A. DESCRIPTION/DUTIES

Process Operators process, operate, monitor, adjust and maintain processing systems and equipment by:

- Performing operator duties, outside operator duties and control room operations;
- Operating electronic or computerized control panels;
- Controlling process start up and shut down and performing troubleshooting duties;
- Monitoring outside process equipment;
- Adjusting equipment, valves, pumps and controls, and process equipment;
- Completing required maintenance documentation;
- Preparing process units or production equipment for maintenance;
- Sampling, testing and preparing reports on process operations;
- Participating in safety audits and programs, and provides emergency response

Process Operators are knowledgeable in:

Mathematics	Reading Diagrams
Instrumentation Control	Valves
Plant Science	Chemical/Refinery Plant Operations
Introduction to Distillation	Compressors
Piping and Auxiliaries	Distillation
Chemistry	Electrical Equipment
Process Operations	Environmental Protection
Troubleshooting	Filtration and Screening
Process Reactor Fundamentals	Heat Exchangers
Pumps	Operator Responsibilities

They are employed by petro-chemical, agricultural, pharmaceutical, power, pulp and paper, steel and food processing industries.

**BENCHMARK/GUIDELINE TOTAL TRAINING
TIMEFRAMES: (ON-THE-JOB AND OFF-THE-JOB):**

6480 hours

Includes a minimum of 720 hours of in-school or equivalent correspondence training.

B. ON-THE-JOB PERFORMANCE OBJECTIVES

246F01.0 DEMONSTRATE SAFE WORKING PRACTICES AND PROCEDURES

GENERAL PERFORMANCE OBJECTIVE

Demonstrate safe working practices and procedures by identifying and taking corrective action against potential workplace health and safety hazards; handling, storing and disposing of hazardous workplace materials; complying with workplace legislation relating to health and safety; wearing and maintaining personal protective equipment, practicing good housekeeping in the workplace and applying lock out and tag out procedures in accordance with relevant legislation, manufacturer's recommendations and company policies.

- 246F01.01 Take corrective action against potential workplace health and safety hazards** including: noxious fumes and dust, high intensity light, fires, elevated work sites, suspended loads, poor lighting, extreme temperatures, inadequate ventilation, confined spaces, untidy work sites and uncontrolled power sources so that the potential for personal injury and damage to equipment and the environment are minimized in accordance with applicable manufacturer's instructions, government regulations and company policies.

Date Completed

Apprentice

Supervisor/Trainer

- 246F01.02 Handle, store and dispose of hazardous workplace materials** including lead, gases, acids and solvents so that individuals are protected from injury, the environment from contamination and safety practices are followed in accordance with WHMIS, OHSA, manufacturer's instructions and company procedures and policies.

Date Completed

Apprentice

Supervisor/Trainer

- 246F01.03 Comply with workplace legislation** relating to health and safety including the Workplace Hazardous Materials Information Systems (WHMIS) guidelines and the *Occupational Health and Safety Act*.

Date Completed

Apprentice

Supervisor/Trainer

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B. ON-THE-JOB PERFORMANCE OBJECTIVES (cont'd):

- 246F01.04** **Wear and maintain personal protective equipment** including eye, ear, hand, respiratory, body and foot protection, ensuring that correct fit and optimum protection is provided to the wearer for the specific task performed in accordance with applicable government regulations, manufacturer's specifications and company policy.

Date Completed

Apprentice

Supervisor/Trainer

- 246F01.05** **Practice good housekeeping in the workplace** by ensuring that the workplace is clean, organized and free of obstructions, spills or fire hazards; that materials and equipment are cleaned and stored in designated areas after use and that protective barriers, UV shields and guards are erected so that accident or injury potential is minimized.

Date Completed

Apprentice

Supervisor/Trainer

- 246F01.06** **Apply lockout and tag procedures** and de-energizing procedures to electrical, mechanical, hydraulic and pneumatic equipment before commencing maintenance and overhaul, in accordance with the CEC, the BPVR, the OHSA, manufacturers' instructions and company policies and procedures.

Date Completed

Apprentice

Supervisor/Trainer

246F02.0 EMPLOY JOB INFORMATION RESOURCES

GENERAL PERFORMANCE OBJECTIVE

Employ job information resources by determining in-house operation and maintenance requirements; interpreting electrical, mechanical and structural blueprints; communicating with co-workers; writing reports; maintaining service documents; and preparing work orders so that the information needed to plan and complete maintenance activities is made available and used.

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B. ON-THE-JOB PERFORMANCE OBJECTIVES (cont'd):

246F02.01 Determine operation and maintenance requirements by researching codes, manuals, manufacturers' specifications and recommendations, warranties, preventive maintenance schedule sheets and government regulations; identifying system and component types, capacities, tolerances and limitations, safety procedures, replacement procedures and in-house maintenance and licensing limitations; updating maintenance inspection routines and locating any other necessary information to complete the job in accordance with all regulations and company procedures.

Date Completed

Apprentice

Supervisor/Trainer

246F02.02 Communicate with co-workers, supervisors, company representatives and other tradespersons by personal communication, telephone, postal service/letter and e-mail, ensuring that information delivered is concise, clear and accurate and is in accordance with company procedures or practices.

Date Completed

Apprentice

Supervisor/Trainer

246F02.03 Write work reports including standard work documentation as well as safety reports, injury reports, environmental reports and maintenance charts by completing them manually or using a computer system, ensuring that written reports are concise, detailed, clear, accurate and timely, in accordance with company practices or procedures.

Date Completed

Apprentice

Supervisor/Trainer

246F02.04 Maintain service documents including service call sheets, work orders, work performance sheets and log books, ensuring that all procedures and maintenance tasks are documented and recorded in accordance with employer's specifications and company procedures or practices.

Date Completed

Apprentice

Supervisor/Trainer

B. ON-THE-JOB PERFORMANCE OBJECTIVES (cont'd):

246F03.0 USE AND MAINTAIN TOOLS AND EQUIPMENT

GENERAL PERFORMANCE OBJECTIVE

Use and maintain hand tools, measuring devices and testing and troubleshooting devices by using and maintaining trade-specific hand tools and associated equipment, measuring devices and testing and troubleshooting devices for mechanical, hydraulic and pneumatic systems so that tools, equipment and devices are used for their intended purpose and are maintained at a standard of repair that is safe and functionally effective.

- 246F03.01 Use and maintain hand tools** including hammers, wrenches, screwdrivers and pliers by determining the correct tool for the job, selecting the tool and required components, documenting use in a tool-control system, testing it, applying it to the job, replacing consumables and repairing or replacing user-maintainable parts so that tools are used for their intended purpose and are maintained at a standard of repair that is safe and functionally effective.

Date Completed

Apprentice

Supervisor/Trainer

- 246F03.02 Use and maintain measuring devices** including those for temperature, pressure, level and flow by determining the correct device or equipment for the job, selecting the device and required components, setting up the device, testing it, applying it to the job, identifying deficiencies, replacing any consumables and repairing or replacing user-maintainable parts so that devices are used for their intended purposes and are maintained at a standard of repair and accurate calibration that is safe and functionally effective.

Date Completed

Apprentice

Supervisor/Trainer

PROCESS OPERATOR – REFINERY, CHEMICAL AND LIQUID PROCESSES

ON-THE-JOB PERFORMANCE OBJECTIVES (cont'd):

- 246F03.03** **Use and maintain testing and troubleshooting devices** for pressure, hydraulic and pneumatic systems including temperature, pressure, level and flow gauges, and analyzers for gas concentration, liquid concentration, density and specific gravity measurements by determining the correct device or equipment for the job, selecting the device and required components, setting up the device, testing it, monitoring and adjusting its operation, recording results, replacing consumables and repairing or replacing user-maintainable parts so that the devices are used for their intended purposes and are maintained at a standard of repair and accurate calibration that is safe and functionally effective.

Date Completed

Apprentice

Supervisor/Trainer

246F04.0 OPERATE A CENTRAL CONTROL ROOM

GENERAL PERFORMANCE OBJECTIVE

Operate a central control room by monitoring and running electronic or computerized control panels and optimizing physical and chemical processes for several processing units in accordance with process requirements, company standards and manufacturer's specifications.

- 246F04.01** **Monitor and run electronic or computerized control panels** in accordance with company standards and manufacturer's specifications.

Date Completed

Apprentice

Supervisor/Trainer

- 246F04.02** **Optimize physical and chemical processes** for several processing units in accordance with company standards and process requirements.

Date Completed

Apprentice

Supervisor/Trainer

PROCESS OPERATOR – REFINERY, CHEMICAL AND LIQUID PROCESSES

B. ON-THE-JOB PERFORMANCE OBJECTIVES (cont'd):

246F05.0 CONTROL PROCESS OPERATIONS

GENERAL PERFORMANCE OBJECTIVE

Control process operations by starting up, shutting down and performing troubleshooting procedures on process operations in accordance with government and company procedures and standards.

- 246F05.01 Start up and shut down process operations** in accordance with government and company procedures and standards.

Date Completed

Apprentice

Supervisor/Trainer

- 246F05.02 Perform troubleshooting procedures on process operations** in accordance with company procedures.

Date Completed

Apprentice

Supervisor/Trainer

246F06.0 MONITOR OUTSIDE PROCESS EQUIPMENT

GENERAL PERFORMANCE OBJECTIVE

Monitor outside process equipment in accordance with government regulations and company procedures.

Date Completed

Apprentice

Supervisor/Trainer

246F07.0 CONTROL PROCESS MATERIALS

GENERAL PERFORMANCE OBJECTIVE

Control process materials by starting and stopping pumps and controlling pressurizing vessels to unload raw materials from tank trucks, railcars, and other containers and load finished products into appropriate transportation in accordance with company procedures and standards.

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B. ON-THE-JOB PERFORMANCE OBJECTIVES (cont'd):

246F07.01 **Start and stop pumps and control pressurizing vessels** to unload raw materials from tank trucks, railcars, and other containers in accordance with company procedures and standards.

Date Completed

Apprentice

Supervisor/Trainer

246F07.02 **Load finished products** into appropriate transportation in accordance with company procedures and standards.

Date Completed

Apprentice

Supervisor/Trainer

246F08.0 **OPERATE PROCESS EQUIPMENT**

GENERAL PERFORMANCE OBJECTIVE

Operate process equipment by adjusting, maintaining and troubleshooting distillation units, valves, pumps and controls, heat exchangers, piping systems, electrical systems, vacuum systems, evaporation units, and related field instrumentation in accordance with company standards and specifications.

246F08.01 **Initiate and adjust the operation of process equipment** such as distillation units, valves, pumps and controls, heat exchangers, piping systems, electrical systems, vacuum systems, evaporation units, and related field instrumentation in accordance with manufacturer's specifications and company standards and specifications

Date Completed

Apprentice

Supervisor/Trainer

PROCESS OPERATOR – REFINERY, CHEMICAL AND LIQUID PROCESSES

B. ON-THE-JOB PERFORMANCE OBJECTIVES (cont'd):

246F08.02 **Maintain the operation** of distillation units, valves, pumps and controls, heat exchangers, piping systems, electrical systems, vacuum systems, evaporation units, and related field instrumentation in accordance with manufacturer's specifications and company standards and specifications

Date Completed

Apprentice

Supervisor/Trainer

246F09.0 **MAINTAIN VESSELS**

GENERAL PERFORMANCE OBJECTIVE

Maintain vessels by inspecting, cleaning and repairing storage, mixing, blending, decanting, oxidation, hydrogenation, pressure, and vacuum vessels in accordance with company standards and specifications.

246F09.01 **Inspect** storage, mixing, blending, decanting, oxidation, hydrogenation, pressure, and vacuum vessels in accordance with government regulations and company standards and specifications.

Date Completed

Apprentice

Supervisor/Trainer

246F09.02 **Clean and repair** storage, mixing, blending, decanting, oxidation, hydrogenation, pressure, and vacuum vessels in accordance with government regulations and company standards and specifications.

Date Completed

Apprentice

Supervisor/Trainer

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B. ON-THE-JOB PERFORMANCE OBJECTIVES (cont'd):

246F10.0 CONTROL CHEMICAL COMPOSITION

GENERAL PERFORMANCE OBJECTIVE

Control chemical composition by identifying properties, reactions, temperatures, pressures, and chemical analysis; handling, storing, and transferring chemicals; preparing chemicals through weighing, mixing and blending; monitoring yields and balances; and running batch operations in accordance with required procedures and methods and company procedures and standards.

- 246F10.01 Determine properties,** reactions, temperatures, pressures, and chemical analysis of chemical constituents in accordance with standard procedures and methods.

Date Completed

Apprentice

Supervisor/Trainer

- 246F10.02 Handle, store, and transfer chemicals** in accordance with government regulations and company procedures.

Date Completed

Apprentice

Supervisor/Trainer

- 246F10.03 Prepare chemicals** through weighing, mixing and blending in accordance with company procedures and methods.

Date Completed

Apprentice

Supervisor/Trainer

- 246F10.04 Monitor yields and balances** of chemical mixtures in accordance with standard procedures and methods.

Date Completed

Apprentice

Supervisor/Trainer

PROCESS OPERATOR – REFINERY, CHEMICAL AND LIQUID PROCESSES

B. ON-THE-JOB PERFORMANCE OBJECTIVES (cont'd):

246F10.05 Run batch operations in accordance with required procedures and methods and company procedures.

Date Completed

Apprentice

Supervisor/Trainer

246F11.0 MAINTAIN EQUIPMENT

GENERAL PERFORMANCE OBJECTIVE

Maintain equipment by shutting down, isolating and preparing process units and production equipment and repairing them in accordance with company procedures and standards.

246F11.01 Shut down, isolate and prepare process units and production equipment in accordance with company procedures and standards.

Date Completed

Apprentice

Supervisor/Trainer

246F11.02 Troubleshoot and repair process units and production equipment in accordance with company procedures and standards.

Date Completed

Apprentice

Supervisor/Trainer

246F12.0 CARRY OUT STATISTICAL PROCESS CONTROL

GENERAL PERFORMANCE OBJECTIVE

Carry out Statistical Process Control on process operations by sampling products, performing tests, recording data and completing required documentation in accordance with company procedures and standards.

B. ON-THE-JOB PERFORMANCE OBJECTIVES (cont'd):

PROCESS OPERATOR – REFINERY, CHEMICAL AND LIQUID PROCESSES

246F12.01 **Sample products and perform tests** in accordance with company procedures and standards.

Date Completed

Apprentice

Supervisor/Trainer

246F12.02 **Record data** and complete required documentation in accordance with company procedures and standards.

Date Completed

Apprentice

Supervisor/Trainer

C. LEARNING OUTCOMES (Off-the-Job/In-School Learning)

In-school training is a maximum of 720 hours or may be completed by approved, self-paced correspondence learning.

1. Mathematics

The apprentice is able to solve mathematical problems using:

- addition, subtraction, multiplication, division, fractions and decimals
- conversion tables, rates, charts, graphs and trends
- equations, algebraic applications and formulas

2. Instrumentation Control

The apprentice is able to explain in detail the following concepts and procedures relating to instrumentation control:

- process instrumentation, reading instruments
- pressure, temperature, level and flow measurement; analytical measurements
- liquid and gas concentration analysis; density and specific gravity analysis; clarity analysis; humidity and moisture analysis
- basic instruments; transmitters and transducers; recorders; indicators and protective devices; controllers; final control elements
- process control concepts; feed-back/feed-forward control; process dynamics; two position and proportional control; reset and rate control; PID control; digital control; control loops; PLCs; control systems; information displays and control system operation

3. Plant Science

The apprentice is able to explain and solve problems in:

- science principles; units of measurement; force and motion; work power and efficiency; basic machines
- matter; properties of solids, liquids, gases, and flowing fluids; heat; temperatures; latent heat
- modes of heat transfer; heat transfer between fluids; heat exchanger operation; systems
- fluid basics; liquid systems; gas and vapour systems
- basic process measurement; process dynamics
- basic electricity; electricity, magnetism and alternating current; electric motors; transformers and solenoids; basic circuits; electrical systems operation

4. Introduction to Distillation

The apprentice is able to describe:

- distillation principles; distillation systems
- towers, and equipment; types of distillation towers

B. LEARNING OUTCOMES (cont'd)

5. Piping and Auxiliaries

The apprentice is able to identify and explain the application of:

- piping and auxiliaries; pipe supports and expansion devices; insulation and heat tracing
- protective devices; steam traps; and, draining and filling fluid systems

6. Chemistry

The apprentice is able to explain chemical action relating to:

- limiting factors; material balancing; reaction rates; catalysts
- equilibrium reactions; chemical reactions
- compounds and mixtures; and, solutions and concentrations

7. Process Operations Troubleshooting

The apprentice is able to describe the procedures relating to implementation of:

- process operations and troubleshooting; the process of elimination
- troubleshooting procedures and examples; troubleshooting control systems

8. Process Reactor Fundamentals

The apprentice is able to describe:

- reactor principles; basic reactor design
- stirred tank reactors; tubular reactors; catalytic bed reactors; and, reactor operations

9. Pumps

The apprentice is able to identify and describe:

- types of pumps; pump auxiliaries
- inspection of an operating pump
- reciprocating pumps; rotary pumps
- reciprocating pump start-up and shut-down; rotary pump start-up and shut down
- centrifugal pump parts and functions; single stage centrifugal pumps; multistage centrifugal pumps
- single stage centrifugal pump start-up and shut-down; and, multistage centrifugal pump start-up and shut-down

10. Reading Diagrams

The apprentice is able to:

- Identify and read diagrams
- describe flow diagrams; piping diagrams
- describe instrumentation and electrical diagrams

B. LEARNING OUTCOMES (cont'd)

11. Valves

The apprentice is able to identify and describe the operation of:

- valves; gate, globe, angle, and needle valves
- plug, ball, and butterfly valves
- diaphragm, pinch, and check valves
- relief and safety valves
- actuators; pneumatic actuators; electric actuators; hydraulic actuators

12. Chemical/ Refinery Plant Operations

The apprentice is able to describe chemical and refinery plant operations:

- equipment and systems
- processes
- operators

13. Compressors

The apprentice is able to describe:

- compressor components
- compressor operation

14. Distillation

The apprentice is able to describe

- basic principles of distillation
- basic system components and operation
- towers, reboilers, and condensers

15. Electrical Equipment

The apprentice is able to describe and explain:

- electrical production and distribution
- breakers, switches, and safety
- AC/DC motors
- motor controllers

16. Environmental Protection

The apprentice is able to describe:

- air pollution, water pollution
- waste disposal procedures (Canadian applications)

17. Filtration and Screening

The apprentice is able to describe

- filtering and screening; screens;
- screen operations; cartridge filter operations; gravity and pressure filter operations; and, pre-coat filter operations

C. LEARNING OUTCOMES (cont'd)

18. Heat Exchangers

The apprentice is able to describe:

- principles of heat transfer;
- shell and tube heat exchangers; applications and operations;
- introduction to cooling towers; cooling tower design, operation and chemical addition;
- condenser operations; and,
- reboiler operations

19. Operator Responsibilities

The apprentice is able to describe:

- the operator's role; general outside operator responsibilities
- plant equipment maintenance roles
- general control room operator responsibilities
- how operators detect and use trends
- abnormal and emergency situations
- safety responsibilities
- data collection responsibilities
- production responsibilities
- interpersonal responsibilities

PROCESS OPERATOR – REFINERY, CHEMICAL AND LIQUID PROCESSES

APPRENTICE RECORD

APPRENTICE NAME (Print):

SPONSOR/EMPLOYER INFORMATION	
Training Agreement #	
Name	
Address	
Telephone	
E-mail Address	

SUMMARY OF TRAINING	
Employment Start Date	
Employment End Date	
Total hours of training & instruction between dates of employment.	

Date Completed

Apprentice

Supervisor/Trainer

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You will be required to disclose this signed form to the Ministry of Training, Colleges and Universities in order to complete your program. The Ministry will use your personal information to administer and finance Ontario's apprenticeship training system. For further information please see the notice/declaration for collection of personal information that is referenced in the table of contents of this training standard.