Chemical and Refining Process Technician
Skill Standards

TEXAS WORKFORCE
INVESTMENT COUNCIL

Occupational Skills and Knowledge Definitions

1. Process Variables - Knowledge of effects and relationships of process variables such as pressure, composition, temperature, level, and flow.

2. Operating Parameters - Knowledge of normal operating procedures and design limits, and the differences between them.

3. System Components - Knowledge of system components and their functions.

4. Heat and/or Material Balances - Calculate heat and or material balance for quality and cost optimization.

5. Distillation - Understanding of distillation fundamentals and batch and continuous distillation systems.

6. SHE (Safety, Health, & Environment) - Understand incidents, hazards, risks, audits, investigations, and unsafe work practices, and awareness of critical federal, state, and local regulations.

7. Instrumentation and Control Systems - Knowledge of measurement, controls, instrumentation, and Distributive Control Systems (DCS).

8. Troubleshooting - Ability to recognize a problem, collect and analyze information, define root cause, and take an appropriate plan of action.

9. Process Symbols - Understand symbols used in process diagrams.

10. Process Drawings - Ability to interpret and sketch process diagrams.

11. Stripping - Understanding stripping fundamentals (boiling points, vapor pressures, latent heat, sensible heat, viscosity, applied pressure, flash points), mediums used (steam, nitrogen, air), and purposes (flash point control, H2S stripping, light ends removal).

12. Filtration - Understanding of filtration fundamentals (filters, solvents, flow rate, pressure, particle size) and filtration systems (plate and frame, rotary vacuum, centrifuge, filter aids, cyclonic, sand filters).

13. Absorption - Understanding of absorption fundamentals (relative solubility, temperature, feed rates) and absorption systems (scrubbing medium, towers) and purposes (removing hazardous gasses, product purification, product manufacturing).

14. Adsorption - Understanding of adsorption fundamentals (capacity, saturation, regeneration, pressure differential) and paced or plate adsorption systems (ionic exchange, demineralizing, anthracite filters, and zeolites).

15. Extraction - Understanding of extraction fundamentals (distribution coefficient, solubility, specific gravity, interface) and liquid/liquid, liquid/solids, recycle streams, counter current, cross current, batch/continuous systems.

16. Dehydration - Understanding of dehydration fundamentals (drying medium temperature, psychometry, direct/indirect drying) and the purpose and types of dehydration systems (spray dryer, rotary vacuum dryer, tray dryer).

17. Decanting - Understanding of decanting fundamentals (specific gravity, residence time, interface, skimming).

18. Fired Heaters/Furnaces - Knowledge of fired heaters/furnace fundamentals (heat transfer, flame

impinging) and systems (induced draft, forced draft, convection section, radiant section, shock bank, dampner, air registers).

19. Boilers - Understanding of boiler fundamentals (boiling point, latent heat, superheat, radiant heat, desuperheating, chemical addition, water quality, thermal shock) and how the boiler system works (heat recovery).

20. Cooling Water - Understanding of cooling water fundamentals (rate of evaporation, pH, conductivity, micro-bio content, chemical injection) and cooling water systems (counter flow, cross flow, temperature control).

21. Refrigeration - Understanding of refrigeration fundamentals (energy transfer, sensible heat, latent heat, refrigerants, refrigeration expansion/contraction cycles) and the purpose and types of refrigeration systems (adsorption and mechanical steam driven, turbine, or electrical motor).

22. Heat Exchangers - Understanding of heat exchanger fundamentals (temperature changes, conduction, convection, fouling, leaks, thermo-siphon) and types of heat exchangers (shell-tube, single pass, multiple pass, floating head, condensers, Gfin, plate and frame, fin fan, and cooling mediums).

23. Continuous Reaction - Understanding of continuous reaction fundamentals (e.g., flow, temperature, reaction rate, feed quality & consistency, catalysts, and pressures) and continuous reaction systems (e.g., what is a fixed bed, liquid, catalyst injection, fluidized bed).

24. Batch Reaction - Understanding of batch reaction system fundamentals (e.g., levels, temperature, reaction rate, feed quality and consistency, pressures, catalyst, agitation).

25. Steam Generation/Distribution - Understanding of steam generation fundamentals (e.g., BFW– boiler feed water- quality; superheaters; dry vs. wet steam; excess O2 control; excess O2 fuel air control; pressure-temperature relationship; boiler level; shrink and swell; three element control) and the purpose and types of steam generation systems (e.g., Drafts – natural, forced, balanced, induced fire-tubed, water-tubed, tube and shell; Source of Heat – gas, oil, coal, electrical, dual fuel, and waste heat) and the understanding of steam distribution (e.g., headers, pressure let down, steam traps, and condensate recovery).

26. Electrical Generation/Distribution - Understanding of electrical power generation (e.g., turbines, generators, auxiliary equipment, voltage, currents, Ohms, excitation, MCC-motor control center, emergency back-up supply) and power generation sources (e.g., cogen, auxiliary equipment, transformers, boilers, and turbines).

27. Waste Incineration - Understanding of waste incineration fundamentals (e.g., air emissions, excess O2, Nox, VOC, phases of waste, temperature) and the purpose and types of waste incineration systems (e.g., natural, forced, balanced or induced draft, solid/vapor/liquid incinerators).

28. Flare - Understanding of flare system fundamentals (e.g., density, process variables, emissions, opacity, sweep gas) and the purpose and types of flare systems (e.g., ground flare, vertical flare, equipment).

29. Water Systems - Understanding of fundamentals of water systems (e.g., potable, process, utility, fire, service, storm, waste) and water system components (e.g., filtration, clarification, tanks, aeration, reverse osmosis, demineralization, and deionization).

30. Instrument Air - Understanding of instrument air fundamentals (dew point, filtration, system pressure) and instrument air systems (dryers, filters, cycles, compressors, desiccant filters, switching, receivers, KO pots, backups - N2 utility air).

31. Utility Air - Understanding of utility air fundamentals (e.g., higher pressure and moisture content than instrument air, compression, uses-pneumatics, atomization, waste treatment) and utility air systems (e.g., filters, compressors, headers, manifolds, and back-ups).

32. Material Sampling - Knowledge of material sampling techniques and of proper labeling procedures for samples collected.

33. Hazard Labeling - Knowledge of standard labeling systems (e.g., NFPA for equipment).

34. Equipment Monitoring - Ability to conduct physical inspections of equipment (tanks, pipes, drums, pumps, vents, and safety equipment).

35. Inventory Control - Knowledge of inventory control fundamentals and its impact.

36. PPE - Knowledge of personal protective equipment and its appropriate use.

37. Safety Equipment Operations - Knowledge of operating safety equipment.

38. Boiler Feed Water - Understanding of boiler feed water fundamentals (e.g., pressures, phase change/flash point, uses, sources, makeups, chemical treatment, hydrology) and boiler feed water systems (e.g., aerators, softeners, accumulators, demins, blow downs, condensate return).

39. Steam Condensate - Understanding of condensate fundamentals (e.g., condensate purity, system pressure, uses, sources) and condensate systems (e.g., flash tanks, drain pots, desuper heater, steam traps, analyzers, let down stations).

40. Natural Gas - Understanding of natural gas fundamentals (e.g., properties & chemistry of natural gas, uses - blanketing, fuel, processes, sources - local utilities, pipelines) and natural gas systems (e.g., pilot gas, compressors, regulators, KO pots, emergency shut downs).

41. Fuel Gas - Understanding of fuel fundamentals—liquids, solids, and gases (e.g., sources, types, fluctuations in make-up, BTU) and fuel system components (e.g., regulators, knockouts, mixing areas, scrubbers, back-up systems, vaporizers, atomizers, conveyors).

42. Nitrogen - Understanding of nitrogen fundamentals and nitrogen systems.

CHEMICAL / REFINING PROCESS TECHNICIAN SKILL STANDARDS

Critical Work Function	Key Activity	Key Activity	Key Activity	Key Activity	Key Activity	Key Activity	Key Activity	Key Activity
1. Control Separation Systems	1.1 Monitor and regulate distillation system	1.2 Monitor and regulate stripping system	1.3 Monitor and regulate filtration system	1.4 Monitor and regulate absorption system	1.5 Monitor and regulate adsorption system	1.6 Monitor and regulate extraction system	1.7 Monitor and regulate dehydration system	1.8 Monitor and regulate decanting system
2. Control Heat Exchange Systems	2.1 Monitor and regulate fired heaters/ furnace system	2.2 Monitor and regulate boiler system	2.3 Monitor and regulate cooling water system	2.4 Monitor and regulate refrigeration system	2.5 Monitor and regulate heat exchanger system			
3. Control Reaction Systems	3.1 Monitor and regulate continuous reaction system	3.2 Monitor and regulate batch reaction system						
4. Control Generation Systems	4.1 Monitor and regulate steam system	4.2 Monitor electrical generation and/or distribution system						
5. Control Waste Treatment and/or Destruction Systems	5.1 Monitor and regulate thermal oxidation system	5.2 Monitor and regulate flare system	5.3 Monitor and regulate storm water system	5.4 Monitor and regulate waste water system				
6. Control Utility Systems	6.1 Monitor and regulate instrument air system	6.2 Monitor and regulate utility air system	6.3 Monitor and regulate process water system	6.4 Monitor and regulate potable water system	6.5 Monitor and regulate fire water system	6.6 Monitor and regulate service water system	6.7 Monitor and regulate boiler feed water	6.8 Monitor and regulate condensate system
	6.9 Monitor and regulate natural gas system	6.10 Monitor and regulate fuel gas system	6.11 Monitor and regulate nitrogen system					
7. Control Chemical Materials Handling and Storage	7.1 Receive chemical materials	7.2 Store chemical materials	7.3 Transfer chemical materials					
8. Troubleshoot Process Abnormalities and Equipment Malfunctions	8.1 Diagnose malfunction or abnormality	8.2 Remedy equipment / process malfunction						
9. Maintain Safe and Healthful Work Environment	9.1 Conduct preventative SHE inspections	9.2 Conduct SHE incident and hazard investigations	9.3 Instruct individuals entering operating area in SHE policies and procedures		9.4 Comply with company policies and procedures	9.5 Comply with local, state, and federal policies and procedures		

Occupational Title:					
Critical Work Function 1. Control Separation Systems		**Occupational Skills, Knowledge & Conditions**			
Key Activity	**Performance Criteria**	**Occupational Skills & Knowledge**	**Conditions**		
1.1 Monitor and regulate distillation system	1.1.1 Production rates meet desired production level per company specifications. 1.1.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities and other resources. 1.1.3 Product/process meets established process specifications. 1.1.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations. 1.1.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction. 1.1.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy. 1.1.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy. 1.1.8 Process variables meet product and equipment parameters	Process Variables Operating Parameters System Components Heat and/or Material Balances Distillation SHE (Safety, Health, & Environment) Instrumentation and Control Systems Troubleshooting Personal Protective and/or Safety Equipment Operations	Drums Hoses Compressors Extruders Flares Boilers Cryogenic unit Economizer Switch gears Skimmers Steam traps Gloves Respirator Acid suit Ear muffs SCBA (Self-Contained Breathing Apparatus) Face shield Motor control centers Reverse osmosis unit Safety goggles/glasses Drum dolly Pumps (centrifugal, vacuum, positive displacement) Drivers (such as electrical motors, steam turbines, gas turbines, air drivers) Piping Scrubbers	Valves Filters Demisters Condenser Generators Transformers Aerators Clarifiers Fork lift Hand truck Slicker suit Hard hat Eyewash fountain FRCs (Flame Retardant Clothing) Thermal suit Furnaces/fired heaters Fire extinguisher Metatarsal guard Control valve (regulator) Instrumentation (analyzers, gauges, control loops, temperature sensing devices) Tools (such as sample thief, strapping tape, pipe wrench, channel locks, valve wrenches) Tubing Tanks Resins Cooling towers	Dryers Eductors Meters Incinerator Basins pH meters Superheaters Safety boots Ear plugs Safety shower First aid kit Fire monitors Tower (tray, packed) API separators/traps Microfiltration equipment Desuperheaters Heat exchangers (coolers, reboilers, fans) Heat recovery steam generator (waste heat boiler) Reactors (batch stirred tank or continuous stirred tank, fixed bed catalyst or fluidized bed catalyst) Fittings Safety harness Personal lift Computers UPS (uninterruptible power source)

CHEMICAL / REFINING PROCESS TECHNICIAN SKILL STANDARDS

Occupational Title:					
Critical Work Function 1. Control Separation Systems		**Occupational Skills, Knowledge & Conditions**			
Key Activity	**Performance Criteria**	**Occupational Skills & Knowledge**	**Conditions**		
1.2 Monitor and regulate stripping system	1.2.1 Production rates meet desired production level per company specifications. 1.2.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities and other resources. 1.2.3 Product/process meets established process specifications. 1.2.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations. 1.2.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction. 1.2.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy. 1.2.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy. 1.2.8 Process variables meet product and equipment parameters	Process Variables Operating Parameters System Components Heat and/or Material Balances SHE (Safety, Health, & Environment) Instrumentation and Control Systems Troubleshooting Stripping Equipment Monitoring Personal Protective and/or Safety Equipment Operations	Drums Hoses Compressors Extruders Flares Boilers Cryogenic unit Economizer Switch gears Skimmers Steam traps Gloves Respirator Acid suit Ear muffs SCBA (Self-Contained Breathing Apparatus) Face shield Motor control centers Reverse osmosis unit Safety goggles/glasses Drum dolly Pumps (centrifugal, vacuum, positive displacement) Drivers (such as electrical motors, steam turbines, gas turbines, air drivers) Piping Scrubbers	Valves Filters Demisters Condenser Generators Transformers Aerators Clarifiers Fork lift Hand truck Slicker suit Hard hat Eyewash fountain FRCs (Flame Retardant Clothing) Thermal suit Furnaces/fired heaters Fire extinguisher Metatarsal guard Control valve (regulator) Instrumentation (analyzers, gauges, control loops, temperature sensing devices) Tools (such as sample thief, strapping tape, pipe wrench, channel locks, valve wrenches) Tubing Tanks Resins Cooling towers	Dryers Eductors Meters Incinerator Basins pH meters Superheaters Safety boots Ear plugs Safety shower First aid kit Fire monitors Tower (tray, packed) API separators/traps Microfiltration equipment Desuperheaters Heat exchangers (coolers, reboilers, fans) Heat recovery steam generator (waste heat boiler) Reactors (batch stirred tank or continuous stirred tank, fixed bed catalyst or fluidized bed catalyst) Fittings Safety harness Personal lift Computers UPS (uninterruptible power source)

CHEMICAL / REFINING PROCESS TECHNICIAN SKILL STANDARDS

Occupational Title:					
Critical Work Function 1. Control Separation Systems		**Occupational Skills, Knowledge & Conditions**			
Key Activity	**Performance Criteria**	**Occupational Skills & Knowledge**	**Conditions**		
1.3 Monitor and regulate filtration system	1.3.1 Production rates meet desired production level per company specifications. 1.3.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities and other resources. 1.3.3 Product/process meets established process specifications. 1.3.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations. 1.3.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction. 1.3.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy. 1.3.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy. 1.3.8 Process variables meet product and equipment parameters	Process Variables Operating Parameters System Components SHE (Safety, Health, & Environment) Instrumentation and Control Systems Troubleshooting Filtration Material Sampling Equipment Monitoring Personal Protective and/or Safety Equipment Operations	Drums Hoses Compressors Extruders Flares Boilers Cryogenic unit Economizer Switch gears Skimmers Steam traps Gloves Respirator Acid suit Ear muffs SCBA (Self-Contained Breathing Apparatus) Face shield Motor control centers Reverse osmosis unit Safety goggles/glasses Drum dolly Pumps (centrifugal, vacuum, positive displacement) Drivers (such as electrical motors, steam turbines, gas turbines, air drivers) Piping Scrubbers	Valves Filters Demisters Condenser Generators Transformers Aerators Clarifiers Fork lift Hand truck Slicker suit Hard hat Eyewash fountain FRCs (Flame Retardant Clothing) Thermal suit Furnaces/fired heaters Fire extinguisher Metatarsal guard Control valve (regulator) Instrumentation (analyzers, gauges, control loops, temperature sensing devices) Tools (such as sample thief, strapping tape, pipe wrench, channel locks, valve wrenches) Tubing Tanks Resins Cooling towers	Dryers Eductors Meters Incinerator Basins pH meters Superheaters Safety boots Ear plugs Safety shower First aid kit Fire monitors Tower (tray, packed) API separators/traps Microfiltration equipment Desuperheaters Heat exchangers (coolers, reboilers, fans) Heat recovery steam generator (waste heat boiler) Reactors (batch stirred tank or continuous stirred tank, fixed bed catalyst or fluidized bed catalyst) Fittings Safety harness Personal lift Computers UPS (uninterruptible power source)

CHEMICAL / REFINING PROCESS TECHNICIAN SKILL STANDARDS

Occupational Title:					
Critical Work Function 1. Control Separation Systems		**Occupational Skills, Knowledge & Conditions**			
Key Activity	**Performance Criteria**	**Occupational Skills & Knowledge**	**Conditions**		
1.4 Monitor and regulate absorption system	1.4.1 Production rates meet desired production level per company specifications. 1.4.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities and other resources. 1.4.3 Product/process meets established process specifications. 1.4.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations. 1.4.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction. 1.4.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy. 1.4.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy. 1.4.8 Process variables meet product and equipment parameters	Process Variables Operating Parameters System Components Heat and/or Material Balances SHE (Safety, Health, & Environment) Instrumentation and Control Systems Troubleshooting Absorption Material Sampling Equipment Monitoring Personal Protective and/or Safety Equipment Operations	Drums Hoses Compressors Extruders Flares Boilers Cryogenic unit Economizer Switch gears Skimmers Steam traps Gloves Respirator Acid suit Ear muffs SCBA (Self-Contained Breathing Apparatus) Face shield Motor control centers Reverse osmosis unit Safety goggles/glasses Drum dolly Pumps (centrifugal, vacuum, positive displacement) Drivers (such as electrical motors, steam turbines, gas turbines, air drivers) Piping Scrubbers	Valves Filters Demisters Condenser Generators Transformers Aerators Clarifiers Fork lift Hand truck Slicker suit Hard hat Eyewash fountain FRCs (Flame Retardant Clothing) Thermal suit Furnaces/fired heaters Fire extinguisher Metatarsal guard Control valve (regulator) Instrumentation (analyzers, gauges, control loops, temperature sensing devices) Tools (such as sample thief, strapping tape, pipe wrench, channel locks, valve wrenches) Tubing Tanks Resins Cooling towers	Dryers Eductors Meters Incinerator Basins pH meters Superheaters Safety boots Ear plugs Safety shower First aid kit Fire monitors Tower (tray, packed) API separators/traps Microfiltration equipment Desuperheaters Heat exchangers (coolers, reboilers, fans) Heat recovery steam generator (waste heat boiler) Reactors (batch stirred tank or continuous stirred tank, fixed bed catalyst or fluidized bed catalyst) Fittings Safety harness Personal lift Computers UPS (uninterruptible power source)

CHEMICAL / REFINING PROCESS TECHNICIAN SKILL STANDARDS

Occupational Title:					
Critical Work Function 1. Control Separation Systems		**Occupational Skills, Knowledge & Conditions**			
Key Activity	**Performance Criteria**	**Occupational Skills & Knowledge**	**Conditions**		
1.5 Monitor and regulate adsorption system	1.5.1 Production rates meet desired production level per company specifications. 1.5.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities and other resources. 1.5.3 Product/process meets established process specifications. 1.5.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations. 1.5.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction. 1.5.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy. 1.5.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy. 1.5.8 Process variables meet product and equipment parameters	Process Variables Operating Parameters System Components SHE (Safety, Health, & Environment) Instrumentation and Control Systems Troubleshooting Adsorption Equipment Monitoring Personal Protective and/or Safety Equipment Operations	Drums Hoses Compressors Extruders Flares Boilers Cryogenic unit Economizer Switch gears Skimmers Steam traps Gloves Respirator Acid suit Ear muffs SCBA (Self-Contained Breathing Apparatus) Face shield Motor control centers Reverse osmosis unit Safety goggles/glasses Drum dolly Pumps (centrifugal, vacuum, positive displacement) Drivers (such as electrical motors, steam turbines, gas turbines, air drivers) Piping Scrubbers	Valves Filters Demisters Condenser Generators Transformers Aerators Clarifiers Fork lift Hand truck Slicker suit Hard hat Eyewash fountain FRCs (Flame Retardant Clothing) Thermal suit Furnaces/fired heaters Fire extinguisher Metatarsal guard Control valve (regulator) Instrumentation (analyzers, gauges, control loops, temperature sensing devices) Tools (such as sample thief, strapping tape, pipe wrench, channel locks, valve wrenches) Tubing Tanks Resins Cooling towers	Dryers Eductors Meters Incinerator Basins pH meters Superheaters Safety boots Ear plugs Safety shower First aid kit Fire monitors Tower (tray, packed) API separators/traps Microfiltration equipment Desuperheaters Heat exchangers (coolers, reboilers, fans) Heat recovery steam generator (waste heat boiler) Reactors (batch stirred tank or continuous stirred tank, fixed bed catalyst or fluidized bed catalyst) Fittings Safety harness Personal lift Computers UPS (uninterruptible power source)

CHEMICAL / REFINING PROCESS TECHNICIAN SKILL STANDARDS

Occupational Title:					
Critical Work Function 1. Control Separation Systems		**Occupational Skills, Knowledge & Conditions**			
Key Activity	**Performance Criteria**	**Occupational Skills & Knowledge**	**Conditions**		
1.6 Monitor and regulate extraction system	1.6.1 Production rates meet desired production level per company specifications. 1.6.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities and other resources. 1.6.3 Product/process meets established process specifications. 1.6.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations. 1.6.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction. 1.6.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy. 1.6.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy. 1.6.8 Process variables meet product and equipment parameters	Process Variables Operating Parameters System Components SHE (Safety, Health, & Environment) Instrumentation and Control Systems Troubleshooting Extraction Material Sampling Equipment Monitoring Personal Protective and/or Safety Equipment Operations	Drums Hoses Compressors Extruders Flares Boilers Cryogenic unit Economizer Switch gears Skimmers Steam traps Gloves Respirator Acid suit Ear muffs SCBA (Self-Contained Breathing Apparatus) Face shield Motor control centers Reverse osmosis unit Safety goggles/glasses Drum dolly Pumps (centrifugal, vacuum, positive displacement) Drivers (such as electrical motors, steam turbines, gas turbines, air drivers) Piping Scrubbers	Valves Filters Demisters Condenser Generators Transformers Aerators Clarifiers Fork lift Hand truck Slicker suit Hard hat Eyewash fountain FRCs (Flame Retardant Clothing) Thermal suit Furnaces/fired heaters Fire extinguisher Metatarsal guard Control valve (regulator) Instrumentation (analyzers, gauges, control loops, temperature sensing devices) Tools (such as sample thief, strapping tape, pipe wrench, channel locks, valve wrenches) Tubing Tanks Resins Cooling towers	Dryers Eductors Meters Incinerator Basins pH meters Superheaters Safety boots Ear plugs Safety shower First aid kit Fire monitors Tower (tray, packed) API separators/traps Microfiltration equipment Desuperheaters Heat exchangers (coolers, reboilers, fans) Heat recovery steam generator (waste heat boiler) Reactors (batch stirred tank or continuous stirred tank, fixed bed catalyst or fluidized bed catalyst) Fittings Safety harness Personal lift Computers UPS (uninterruptible power source)

Occupational Title:					
Critical Work Function 1. Control Separation Systems		**Occupational Skills, Knowledge & Conditions**			
Key Activity	**Performance Criteria**	**Occupational Skills & Knowledge**	**Conditions**		
1.7 Monitor and regulate dehydration system	1.7.1 Production rates meet desired production level per company specifications. 1.7.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities and other resources. 1.7.3 Product/process meets established process specifications. 1.7.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations. 1.7.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction. 1.7.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy. 1.7.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy. 1.7.8 Process variables meet product and equipment parameters	Process Variables Operating Parameters System Components SHE (Safety, Health, & Environment) Instrumentation and Control Systems Troubleshooting Dehydration Personal Protective and/or Safety Equipment Operations	Drums Hoses Compressors Extruders Flares Boilers Cryogenic unit Economizer Switch gears Skimmers Steam traps Gloves Respirator Acid suit Ear muffs SCBA (Self-Contained Breathing Apparatus) Face shield Motor control centers Reverse osmosis unit Safety goggles/glasses Drum dolly Pumps (centrifugal, vacuum, positive displacement) Drivers (such as electrical motors, steam turbines, gas turbines, air drivers) Piping Scrubbers	Valves Filters Demisters Condenser Generators Transformers Aerators Clarifiers Fork lift Hand truck Slicker suit Hard hat Eyewash fountain FRCs (Flame Retardant Clothing) Thermal suit Furnaces/fired heaters Fire extinguisher Metatarsal guard Control valve (regulator) Instrumentation (analyzers, gauges, control loops, temperature sensing devices) Tools (such as sample thief, strapping tape, pipe wrench, channel locks, valve wrenches) Tubing Tanks Resins Cooling towers	Dryers Eductors Meters Incinerator Basins pH meters Superheaters Safety boots Ear plugs Safety shower First aid kit Fire monitors Tower (tray, packed) API separators/traps Microfiltration equipment Desuperheaters Heat exchangers (coolers, reboilers, fans) Heat recovery steam generator (waste heat boiler) Reactors (batch stirred tank or continuous stirred tank, fixed bed catalyst or fluidized bed catalyst) Fittings Safety harness Personal lift Computers UPS (uninterruptible power source)

CHEMICAL / REFINING PROCESS TECHNICIAN SKILL STANDARDS

Occupational Title:					
Critical Work Function 1. Control Separation Systems		**Occupational Skills, Knowledge & Conditions**			
Key Activity	**Performance Criteria**	**Occupational Skills & Knowledge**	**Conditions**		
1.8 Monitor and regulate decanting system	1.8.1 Production rates meet desired production level per company specifications. 1.8.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities and other resources. 1.8.3 Product/process meets established process specifications. 1.8.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations. 1.8.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction. 1.8.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy. 1.8.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy. 1.8.8 Process variables meet product and equipment parameters	Process Variables Operating Parameters System Components SHE (Safety, Health, & Environment) Instrumentation and Control Systems Troubleshooting Decanting Material Sampling Equipment Monitoring Personal Protective and/or Safety Equipment Operations	Drums Hoses Compressors Extruders Flares Boilers Cryogenic unit Economizer Switch gears Skimmers Steam traps Gloves Respirator Acid suit Ear muffs SCBA (Self-Contained Breathing Apparatus) Face shield Motor control centers Reverse osmosis unit Safety goggles/glasses Drum dolly Pumps (centrifugal, vacuum, positive displacement) Drivers (such as electrical motors, steam turbines, gas turbines, air drivers) Piping Scrubbers	Valves Filters Demisters Condenser Generators Transformers Aerators Clarifiers Fork lift Hand truck Slicker suit Hard hat Eyewash fountain FRCs (Flame Retardant Clothing) Thermal suit Furnaces/fired heaters Fire extinguisher Metatarsal guard Control valve (regulator) Instrumentation (analyzers, gauges, control loops, temperature sensing devices) Tools (such as sample thief, strapping tape, pipe wrench, channel locks, valve wrenches) Tubing Tanks Resins Cooling towers	Dryers Eductors Meters Incinerator Basins pH meters Superheaters Safety boots Ear plugs Safety shower First aid kit Fire monitors Tower (tray, packed) API separators/traps Microfiltration equipment Desuperheaters Heat exchangers (coolers, reboilers, fans) Heat recovery steam generator (waste heat boiler) Reactors (batch stirred tank or continuous stirred tank, fixed bed catalyst or fluidized bed catalyst) Fittings Safety harness Personal lift Computers UPS (uninterruptible power source)

CHEMICAL / REFINING PROCESS TECHNICIAN SKILL STANDARDS

Academic and Employability Knowledge and Skill Matrix for Critical Work Function 1: Control Separation Systems

On a scale of 1 (lowest) to 5 (highest), identify the level of complexity required in each of these skills for the worker to perform the critical work function. Keep in mind that this scale is not for rating an individual's proficiency. It is intended only for rating the level of complexity required to do the work.

Occupational Title: Chemical/Refining Process Technician																
CWF 1 Control Separation Systems																
Listening	Speaking	Using Information and Communication Technology	Gathering and analyzing Information	Analyzing and Solving Problems	Making Decisions and Judgments	Organizing and Planning	Using Social Skills	Adaptability	Working in Teams	Leading Others	Building Consensus	Self and Career Development	Writing	Reading	Mathematics	Science
4	3	2	3	3	3	3	4	4	3	2	3	3	3	2	2	2

Statement of Assessment for Critical Work Function 1:

The statements of assessment can do any of several things:

- *Define tools or strategies that industry could use to assess the level of competency a worker has attained in a particular critical work function.*
- *Define for trainers and educators how to assess the level of competency a student has attained relevant to the critical work function.*
- *Define the level of mastery of the critical work function that indicates that a worker or student has achieved an entry-, intermediate-, or advanced level of mastery of a critical work function.*

Tools & Strategy: The assessment process should include one or more of the following:

A. Written tests could include:
(1) Multiple choice and essay questions that demonstrate an understanding of knowledge being assessed.
(2) Graphic representations (e.g. P&IDs and loop drawings) that reveal an understanding of symbology and connections between processes and devices.
(3) Preparation and justification of a reasonable solution to a problem scenario.

B. Hands-on exercises or simulations to demonstrate acquisition of knowledge, skills and attitudes that could:
(1) Represent a real life scenario, problem or challenging situation in the context of a work environment.
(2) Apply relevant knowledge or skills.
(3) Focus on the application of knowledge and skills to a new situation.
(4) Demonstrate an ability to plan, organize and create a product or an event.
(5) Illustrate by individual performance the attained levels of knowledge, skills and attitudes.
(6)Include observation of events, groups and individuals that focuses on the relevant traits of the skill or attitude being observed.

Occupational Title: Chemical/Refining Process Technician					
Critical Work Function 2. Control Heat Exchange Systems		**Occupational Skills, Knowledge & Conditions**			
Key Activity	**Performance Criteria**	**Occupational Skills & Knowledge**	**Conditions**		
2.1 Monitor and regulate fired heaters/furnace system	2.1.1 Heat transfer rates meet desired temperature per process/equipment specifications. 2.1.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities and other resources. 2.1.3 Product/process meets established process specifications. 2.1.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations. 2.1.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction. 2.1.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy. 2.1.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy. 2.1.8 Process variables meet product and equipment parameters.	Process Variables Operating Parameters System Components Heat and/or Material Balances SHE (Safety, Health, & Environment) Instrumentation and Control Systems Troubleshooting Fired Heaters/Furnaces Heat Exchangers Equipment Monitoring Personal Protective and/or Safety Equipment Operations Natural Gas Fuel Gas	Drums Hoses Compressors Extruders Flares Boilers Cryogenic unit Economizer Switch gears Skimmers Steam traps Gloves Respirator Acid suit Ear muffs SCBA (Self-Contained Breathing Apparatus) Face shield Motor control centers Reverse osmosis unit Safety goggles/glasses Drum dolly Pumps (centrifugal, vacuum, positive displacement) Drivers (such as electrical motors, steam turbines, gas turbines, air drivers) Piping Scrubbers	Valves Filters Demisters Condenser Generators Transformers Aerators Clarifiers Fork lift Hand truck Slicker suit Hard hat Eyewash fountain FRCs (Flame Retardant Clothing) Thermal suit Furnaces/fired heaters Fire extinguisher Metatarsal guard Control valve (regulator) Instrumentation (analyzers, gauges, control loops, temperature sensing devices) Tools (such as sample thief, strapping tape, pipe wrench, channel locks, valve wrenches) Tubing Tanks Resins Cooling towers	Dryers Eductors Meters Incinerator Basins pH meters Superheaters Safety boots Ear plugs Safety shower First aid kit Fire monitors Tower (tray, packed) API separators/traps Microfiltration equipment Desuperheaters Heat exchangers (coolers, reboilers, fans) Heat recovery steam generator (waste heat boiler) Reactors (batch stirred tank or continuous stirred tank, fixed bed catalyst or fluidized bed catalyst) Fittings Safety harness Personal lift Computers UPS (uninterruptible power source)

Occupational Title: Chemical/Refining Process Technician					
Critical Work Function 2. Control Heat Exchange Systems		**Occupational Skills, Knowledge & Conditions**			
Key Activity	**Performance Criteria**	**Occupational Skills & Knowledge**	**Conditions**		
2.2 Monitor and regulate boiler system	2.2.1 Heat transfer rates meet desired temperature per process/equipment specifications. 2.2.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities and other resources. 2.2.3 Product/process meets established process specifications. 2.2.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations. 2.2.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction. 2.2.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy. 2.2.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy. 2.2.8 Process variables meet product and equipment parameters.	Process Variables Operating Parameters Heat and/or Material Balances SHE (Safety, Health, & Environment) Instrumentation and Control Systems Fired Heaters/Furnaces Boilers Steam Generation Personal Protective and/or Safety Equipment Operations Boiler Feed Water Steam Condensate Natural Gas Fuel Gas	Drums Hoses Compressors Extruders Flares Boilers Cryogenic unit Economizer Switch gears Skimmers Steam traps Gloves Respirator Acid suit Ear muffs SCBA (Self-Contained Breathing Apparatus) Face shield Motor control centers Reverse osmosis unit Safety goggles/glasses Drum dolly Pumps (centrifugal, vacuum, positive displacement) Drivers (such as electrical motors, steam turbines, gas turbines, air drivers) Piping Scrubbers	Valves Filters Demisters Condenser Generators Transformers Aerators Clarifiers Fork lift Hand truck Slicker suit Hard hat Eyewash fountain FRCs (Flame Retardant Clothing) Thermal suit Furnaces/fired heaters Fire extinguisher Metatarsal guard Control valve (regulator) Instrumentation (analyzers, gauges, control loops, temperature sensing devices) Tools (such as sample thief, strapping tape, pipe wrench, channel locks, valve wrenches) Tubing Tanks Resins Cooling towers	Dryers Eductors Meters Incinerator Basins pH meters Superheaters Safety boots Ear plugs Safety shower First aid kit Fire monitors Tower (tray, packed) API separators/traps Microfiltration equipment Desuperheaters Heat exchangers (coolers, reboilers, fans) Heat recovery steam generator (waste heat boiler) Reactors (batch stirred tank or continuous stirred tank, fixed bed catalyst or fluidized bed catalyst) Fittings Safety harness Personal lift Computers UPS (uninterruptible power source)

CHEMICAL / REFINING PROCESS TECHNICIAN SKILL STANDARDS

Occupational Title: Chemical/Refining Process Technician					
Critical Work Function 2. Control Heat Exchange Systems		**Occupational Skills, Knowledge & Conditions**			
Key Activity	**Performance Criteria**	**Occupational Skills & Knowledge**	**Conditions**		
2.3 Monitor and regulate cooling water system	2.3.1 Cooling rates meet desired temperature per process/equipment specifications. 2.3.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities and other resources. 2.3.3 Product/process meets established process specifications. 2.3.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations. 2.3.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction. 2.3.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy. 2.3.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy. 2.3.8 Process variables meet product and equipment parameters.	Process Variables Operating Parameters System Components Heat and/or Material Balances SHE (Safety, Health, & Environment) Instrumentation and Control Systems Troubleshooting Cooling Water Heat Exchangers Material Sampling Equipment Monitoring Personal Protective and/or Safety Equipment Operations	Drums Hoses Compressors Extruders Flares Boilers Cryogenic unit Economizer Switch gears Skimmers Steam traps Gloves Respirator Acid suit Ear muffs SCBA (Self-Contained Breathing Apparatus) Face shield Motor control centers Reverse osmosis unit Safety goggles/glasses Drum dolly Pumps (centrifugal, vacuum, positive displacement) Drivers (such as electrical motors, steam turbines, gas turbines, air drivers) Piping Scrubbers	Valves Filters Demisters Condenser Generators Transformers Aerators Clarifiers Fork lift Hand truck Slicker suit Hard hat Eyewash fountain FRCs (Flame Retardant Clothing) Thermal suit Furnaces/fired heaters Fire extinguisher Metatarsal guard Control valve (regulator) Instrumentation (analyzers, gauges, control loops, temperature sensing devices) Tools (such as sample thief, strapping tape, pipe wrench, channel locks, valve wrenches) Tubing Tanks Resins Cooling towers	Dryers Eductors Meters Incinerator Basins pH meters Superheaters Safety boots Ear plugs Safety shower First aid kit Fire monitors Tower (tray, packed) API separators/traps Microfiltration equipment Desuperheaters Heat exchangers (coolers, reboilers, fans) Heat recovery steam generator (waste heat boiler) Reactors (batch stirred tank or continuous stirred tank, fixed bed catalyst or fluidized bed catalyst) Fittings Safety harness Personal lift Computers UPS (uninterruptible power source)

CHEMICAL / REFINING PROCESS TECHNICIAN SKILL STANDARDS

Occupational Title: Chemical/Refining Process Technician					
Critical Work Function 2. Control Heat Exchange Systems		**Occupational Skills, Knowledge & Conditions**			
Key Activity	**Performance Criteria**	**Occupational Skills & Knowledge**	**Conditions**		
2.4 Monitor and regulate refrigeration system	2.4.1 Production rates meet desired production level per company specifications. 2.4.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities and other resources. 2.4.3 Product/process meets established process specifications. 2.4.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations. 2.4.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction. 2.4.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy. 2.4.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy. 2.4.8 Process variables meet product and equipment parameters.	Process Variables Operating Parameters System Components Heat and/or Material Balances SHE (Safety, Health, & Environment) Instrumentation and Control Systems Troubleshooting Refrigeration Equipment Monitoring Personal Protective and/or Safety Equipment Operations	Drums Hoses Compressors Extruders Flares Boilers Cryogenic unit Economizer Switch gears Skimmers Steam traps Gloves Respirator Acid suit Ear muffs SCBA (Self-Contained Breathing Apparatus) Face shield Motor control centers Reverse osmosis unit Safety goggles/glasses Drum dolly Pumps (centrifugal, vacuum, positive displacement) Drivers (such as electrical motors, steam turbines, gas turbines, air drivers) Piping Scrubbers	Valves Filters Demisters Condenser Generators Transformers Aerators Clarifiers Fork lift Hand truck Slicker suit Hard hat Eyewash fountain FRCs (Flame Retardant Clothing) Thermal suit Furnaces/fired heaters Fire extinguisher Metatarsal guard Control valve (regulator) Instrumentation (analyzers, gauges, control loops, temperature sensing devices) Tools (such as sample thief, strapping tape, pipe wrench, channel locks, valve wrenches) Tubing Tanks Resins Cooling towers	Dryers Eductors Meters Incinerator Basins pH meters Superheaters Safety boots Ear plugs Safety shower First aid kit Fire monitors Tower (tray, packed) API separators/traps Microfiltration equipment Desuperheaters Heat exchangers (coolers, reboilers, fans) Heat recovery steam generator (waste heat boiler) Reactors (batch stirred tank or continuous stirred tank, fixed bed catalyst or fluidized bed catalyst) Fittings Safety harness Personal lift Computers UPS (uninterruptible power source)

Occupational Title: Chemical/Refining Process Technician					
Critical Work Function 2. Control Heat Exchange Systems		**Occupational Skills, Knowledge & Conditions**			
Key Activity	**Performance Criteria**	**Occupational Skills & Knowledge**	**Conditions**		
2.5 Monitor and regulate heat exchanger system	2.5.1 Heat transfer rates meet desired temperature per process/equipment specifications. 2.5.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities and other resources. 2.5.3 Product/process meets established process specifications. 2.5.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations. 2.5.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction. 2.5.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy. 2.5.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy. 2.5.8 Process variables meet product and equipment parameters.	Process Variables Operating Parameters System Components Heat and/or Material Balances SHE (Safety, Health, & Environment) Instrumentation and Control Systems Troubleshooting Cooling Water Heat Exchangers Equipment Monitoring Personal Protective and/or Safety Equipment Operations	Drums Hoses Compressors Extruders Flares Boilers Cryogenic unit Economizer Switch gears Skimmers Steam traps Gloves Respirator Acid suit Ear muffs SCBA (Self-Contained Breathing Apparatus) Face shield Motor control centers Reverse osmosis unit Safety goggles/glasses Drum dolly Pumps (centrifugal, vacuum, positive displacement) Drivers (such as electrical motors, steam turbines, gas turbines, air drivers) Piping Scrubbers	Valves Filters Demisters Condenser Generators Transformers Aerators Clarifiers Fork lift Hand truck Slicker suit Hard hat Eyewash fountain FRCs (Flame Retardant Clothing) Thermal suit Furnaces/fired heaters Fire extinguisher Metatarsal guard Control valve (regulator) Instrumentation (analyzers, gauges, control loops, temperature sensing devices) Tools (such as sample thief, strapping tape, pipe wrench, channel locks, valve wrenches) Tubing Tanks Resins Cooling towers	Dryers Eductors Meters Incinerator Basins pH meters Superheaters Safety boots Ear plugs Safety shower First aid kit Fire monitors Tower (tray, packed) API separators/traps Microfiltration equipment Desuperheaters Heat exchangers (coolers, reboilers, fans) Heat recovery steam generator (waste heat boiler) Reactors (batch stirred tank or continuous stirred tank, fixed bed catalyst or fluidized bed catalyst) Fittings Safety harness Personal lift Computers UPS (uninterruptible power source)

CHEMICAL / REFINING PROCESS TECHNICIAN SKILL STANDARDS

Academic and Employability Knowledge and Skill Matrix for Critical Work Function 2: Control Heat Exchange Systems

On a scale of 1 (lowest) to 5 (highest), identify the level of complexity required in each of these skills for the worker to perform the critical work function. Keep in mind that this scale is not for rating an individual's proficiency. It is intended only for rating the level of complexity required to do the work.

Occupational Title: Chemical/Refining Process Technician																
CWF 2 Control Heat Exchange Systems																
Listening	Speaking	Using Information and Communication Technology	Gathering and analyzing Information	Analyzing and Solving Problems	Making Decisions and Judgments	Organizing and Planning	Using Social Skills	Adaptability	Working in Teams	Leading Others	Building Consensus	Self and Career Development	Writing	Reading	Mathematics	Science
3	3	2	2	4	3	2	4	3	3	3	3	3	2	2	1	1

Statement of Assessment for Critical Work Function 2:

The statements of assessment can do any of several things:

- *Define tools or strategies that industry could use to assess the level of competency a worker has attained in a particular critical work function.*
- *Define for trainers and educators how to assess the level of competency a student has attained relevant to the critical work function.*
- *Define the level of mastery of the critical work function that indicates that a worker or student has achieved an entry-, intermediate-, or advanced level of mastery of a critical work function.*

Tools & Strategy: The assessment process should include one or more of the following:

A. Written tests could include:
(1) Multiple choice and essay questions that demonstrate an understanding of knowledge being assessed.
(2) Graphic representations (e.g. P&IDs and loop drawings) that reveal an understanding of symbology and connections between processes and devices.
(3) Preparation and justification of a reasonable solution to a problem scenario.

B. Hands-on exercises or simulations to demonstrate acquisition of knowledge, skills and attitudes that could:
(1) Represent a real life scenario, problem or challenging situation in the context of a work environment.
(2) Apply relevant knowledge or skills.
(3) Focus on the application of knowledge and skills to a new situation.
(4) Demonstrate an ability to plan, organize and create a product or an event.
(5) Illustrate by individual performance the attained levels of knowledge, skills and attitudes.
(6)Include observation of events, groups and individuals that focuses on the relevant traits of the skill or attitude being observed.

Occupational Title: Chemical/Refining Process Technician					
Critical Work Function 3. Control Reaction Systems		**Occupational Skills, Knowledge & Conditions**			
Key Activity	**Performance Criteria**	**Occupational Skills & Knowledge**	**Conditions**		
3.1 Monitor and regulate continuous reaction system	3.1.1 Chemical reaction rates meet desired production level per company specifications. 3.1.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities and other resources. 3.1.3 Product/process meets established process specifications. 3.1.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations. 3.1.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction. 3.1.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy. 3.1.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy. 3.1.8 Process variables meet product and equipment parameters.	Process Variables Operating Parameters System Components Heat and/or Material Balances SHE (Safety, Health, & Environment) Instrumentation and Control Systems Troubleshooting Continuous Reaction Equipment Monitoring Personal Protective and/or Safety Equipment Operations	Drums Hoses Compressors Extruders Flares Boilers Cryogenic unit Economizer Switch gears Skimmers Steam traps Gloves Respirator Acid suit Ear muffs SCBA (Self-Contained Breathing Apparatus) Face shield Motor control centers Reverse osmosis unit Safety goggles/glasses Drum dolly Pumps (centrifugal, vacuum, positive displacement) Drivers (such as electrical motors, steam turbines, gas turbines, air drivers) Piping Scrubbers	Valves Filters Demisters Condenser Generators Transformers Aerators Clarifiers Fork lift Hand truck Slicker suit Hard hat Eyewash fountain FRCs (Flame Retardant Clothing) Thermal suit Furnaces/fired heaters Fire extinguisher Metatarsal guard Control valve (regulator) Instrumentation (analyzers, gauges, control loops, temperature sensing devices) Tools (such as sample thief, strapping tape, pipe wrench, channel locks, valve wrenches) Tubing Tanks Resins Cooling towers	Dryers Eductors Meters Incinerator Basins pH meters Superheaters Safety boots Ear plugs Safety shower First aid kit Fire monitors Tower (tray, packed) API separators/traps Microfiltration equipment Desuperheaters Heat exchangers (coolers, reboilers, fans) Heat recovery steam generator (waste heat boiler) Reactors (batch stirred tank or continuous stirred tank, fixed bed catalyst or fluidized bed catalyst) Fittings Safety harness Personal lift Computers UPS (uninterruptible power source)

CHEMICAL / REFINING PROCESS TECHNICIAN SKILL STANDARDS

Occupational Title: Chemical/Refining Process Technician					
Critical Work Function 3. Control Reaction Systems		**Occupational Skills, Knowledge & Conditions**			
Key Activity	**Performance Criteria**	**Occupational Skills & Knowledge**	**Conditions**		
3.2 Monitor and regulate batch reaction system	3.2.1 Chemical reaction rates meet desired production level per company specifications. 3.2.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities and other resources. 3.2.3 Product/process meets established process specifications. 3.2.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations. 3.2.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction. 3.2.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy. 3.2.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy. 3.2.8 Process variables meet product and equipment parameters.	Process Variables Operating Parameters System Components Heat and/or Material Balances SHE (Safety, Health, & Environment) Instrumentation and Control Systems Troubleshooting Batch Reaction Equipment Monitoring Personal Protective and/or Safety Equipment Operations	Drums Hoses Compressors Extruders Flares Boilers Cryogenic unit Economizer Switch gears Skimmers Steam traps Gloves Respirator Acid suit Ear muffs SCBA (Self-Contained Breathing Apparatus) Face shield Motor control centers Reverse osmosis unit Safety goggles/glasses Drum dolly Pumps (centrifugal, vacuum, positive displacement) Drivers (such as electrical motors, steam turbines, gas turbines, air drivers) Piping Scrubbers	Valves Filters Demisters Condenser Generators Transformers Aerators Clarifiers Fork lift Hand truck Slicker suit Hard hat Eyewash fountain FRCs (Flame Retardant Clothing) Thermal suit Furnaces/fired heaters Fire extinguisher Metatarsal guard Control valve (regulator) Instrumentation (analyzers, gauges, control loops, temperature sensing devices) Tools (such as sample thief, strapping tape, pipe wrench, channel locks, valve wrenches) Tubing Tanks Resins Cooling towers	Dryers Eductors Meters Incinerator Basins pH meters Superheaters Safety boots Ear plugs Safety shower First aid kit Fire monitors Tower (tray, packed) API separators/traps Microfiltration equipment Desuperheaters Heat exchangers (coolers, reboilers, fans) Heat recovery steam generator (waste heat boiler) Reactors (batch stirred tank or continuous stirred tank, fixed bed catalyst or fluidized bed catalyst) Fittings Safety harness Personal lift Computers UPS (uninterruptible power source)

CHEMICAL / REFINING PROCESS TECHNICIAN SKILL STANDARDS

Academic and Employability Knowledge and Skill Matrix for Critical Work Function 3: Control Reaction Systems

On a scale of 1 (lowest) to 5 (highest), identify the level of complexity required in each of these skills for the worker to perform the critical work function. Keep in mind that this scale is not for rating an individual's proficiency. It is intended only for rating the level of complexity required to do the work.

Occupational Title: Chemical/Refining Process Technician																
CWF 3 Control Reaction Systems																
Listening	Speaking	Using Information and Communication Technology	Gathering and analyzing Information	Analyzing and Solving Problems	Making Decisions and Judgments	Organizing and Planning	Using Social Skills	Adaptability	Working in Teams	Leading Others	Building Consensus	Self and Career Development	Writing	Reading	Mathematics	Science
4	3	2	3	4	3	3	4	4	3	3	3	3	3	4	2	3

Statement of Assessment for Critical Work Function 3:

The statements of assessment can do any of several things:

- *Define tools or strategies that industry could use to assess the level of competency a worker has attained in a particular critical work function.*
- *Define for trainers and educators how to assess the level of competency a student has attained relevant to the critical work function.*
- *Define the level of mastery of the critical work function that indicates that a worker or student has achieved an entry-, intermediate-, or advanced level of mastery of a critical work function.*

Tools & Strategy: The assessment process should include one or more of the following:

A. Written tests could include:
(1) Multiple choice and essay questions that demonstrate an understanding of knowledge being assessed.
(2) Graphic representations (e.g. P&IDs and loop drawings) that reveal an understanding of symbology and connections between processes and devices.
(3) Preparation and justification of a reasonable solution to a problem scenario.

B. Hands-on exercises or simulations to demonstrate acquisition of knowledge, skills and attitudes that could:
(1) Represent a real life scenario, problem or challenging situation in the context of a work environment.
(2) Apply relevant knowledge or skills.
(3) Focus on the application of knowledge and skills to a new situation.
(4) Demonstrate an ability to plan, organize and create a product or an event.
(5) Illustrate by individual performance the attained levels of knowledge, skills and attitudes.
(6)Include observation of events, groups and individuals that focuses on the relevant traits of the skill or attitude being observed.

Occupational Title: Chemical/Refining Process Technician					
Critical Work Function 4. Control Generation Systems		**Occupational Skills, Knowledge & Conditions**			
Key Activity	**Performance Criteria**	**Occupational Skills & Knowledge**	**Conditions**		
4.1 Monitor and regulate steam system	4.1.1 Production rates meet desired production level per company specifications. 4.1.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities and other resources. 4.1.3 Product/process meets established process specifications. 4.1.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations. 4.1.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction. 4.1.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy. 4.1.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy. 4.1.8 Process variables meet product and equipment parameters.	Process Variables Operating Parameters System Components Heat and/or Material Balances SHE (Safety, Health, & Environment) Instrumentation and Control Systems Troubleshooting Boilers Steam Generation Personal Protective and/or Safety Equipment Operations Boiler Feed Water Steam Condensate	Drums Hoses Compressors Extruders Flares Boilers Cryogenic unit Economizer Switch gears Skimmers Steam traps Gloves Respirator Acid suit Ear muffs SCBA (Self-Contained Breathing Apparatus) Face shield Motor control centers Reverse osmosis unit Safety goggles/glasses Drum dolly Pumps (centrifugal, vacuum, positive displacement) Drivers (such as electrical motors, steam turbines, gas turbines, air drivers) Piping Scrubbers	Valves Filters Demisters Condenser Generators Transformers Aerators Clarifiers Fork lift Hand truck Slicker suit Hard hat Eyewash fountain FRCs (Flame Retardant Clothing) Thermal suit Furnaces/fired heaters Fire extinguisher Metatarsal guard Control valve (regulator) Instrumentation (analyzers, gauges, control loops, temperature sensing devices) Tools (such as sample thief, strapping tape, pipe wrench, channel locks, valve wrenches) Tubing Tanks Resins Cooling towers	Dryers Eductors Meters Incinerator Basins pH meters Superheaters Safety boots Ear plugs Safety shower First aid kit Fire monitors Tower (tray, packed) API separators/traps Microfiltration equipment Desuperheaters Heat exchangers (coolers, reboilers, fans) Heat recovery steam generator (waste heat boiler) Reactors (batch stirred tank or continuous stirred tank, fixed bed catalyst or fluidized bed catalyst) Fittings Safety harness Personal lift Computers UPS (uninterruptible power source)

CHEMICAL / REFINING PROCESS TECHNICIAN SKILL STANDARDS

Occupational Title: Chemical/Refining Process Technician					
Critical Work Function 4. Control Generation Systems		**Occupational Skills, Knowledge & Conditions**			
Key Activity	**Performance Criteria**	**Occupational Skills & Knowledge**	**Conditions**		
4.2 Monitor electrical generation / distribution system	4.2.1 Electrical distribution meets desired level per company specifications. 4.2.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities and other resources. 4.2.3 Product/process meets established process specifications. 4.2.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations. 4.2.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction. 4.2.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy. 4.2.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy. 4.2.8 Process variables meet product and equipment parameters.	Process Variables Operating Parameters System Components SHE (Safety, Health, & Environment) Instrumentation and Control Systems Troubleshooting Electrical Generation/Distribution Equipment Monitoring Personal Protective and/or Safety Equipment Operations	Drums Hoses Compressors Extruders Flares Boilers Cryogenic unit Economizer Switch gears Skimmers Steam traps Gloves Respirator Acid suit Ear muffs SCBA (Self-Contained Breathing Apparatus) Face shield Motor control centers Reverse osmosis unit Safety goggles/glasses Drum dolly Pumps (centrifugal, vacuum, positive displacement) Drivers (such as electrical motors, steam turbines, gas turbines, air drivers) Piping Scrubbers	Valves Filters Demisters Condenser Generators Transformers Aerators Clarifiers Fork lift Hand truck Slicker suit Hard hat Eyewash fountain FRCs (Flame Retardant Clothing) Thermal suit Furnaces/fired heaters Fire extinguisher Metatarsal guard Control valve (regulator) Instrumentation (analyzers, gauges, control loops, temperature sensing devices) Tools (such as sample thief, strapping tape, pipe wrench, channel locks, valve wrenches) Tubing Tanks Resins Cooling towers	Dryers Eductors Meters Incinerator Basins pH meters Superheaters Safety boots Ear plugs Safety shower First aid kit Fire monitors Tower (tray, packed) API separators/traps Microfiltration equipment Desuperheaters Heat exchangers (coolers, reboilers, fans) Heat recovery steam generator (waste heat boiler) Reactors (batch stirred tank or continuous stirred tank, fixed bed catalyst or fluidized bed catalyst) Fittings Safety harness Personal lift Computers UPS (uninterruptible power source)

Academic and Employability Knowledge and Skill Matrix for Critical Work Function 4: Control Generation Systems

On a scale of 1 (lowest) to 5 (highest), identify the level of complexity required in each of these skills for the worker to perform the critical work function. Keep in mind that this scale is not for rating an individual's proficiency. It is intended only for rating the level of complexity required to do the work.

Occupational Title: Chemical/Refining Process Technician																
CWF 4 Control Generation Systems																
Listening	Speaking	Using Information and Communication Technology	Gathering and analyzing Information	Analyzing and Solving Problems	Making Decisions and Judgments	Organizing and Planning	Using Social Skills	Adaptability	Working in Teams	Leading Others	Building Consensus	Self and Career Development	Writing	Reading	Mathematics	Science
4	3	2	2	4	3	3	4	4	3	2	3	3	3	4	2	3

Statement of Assessment for Critical Work Function 4:

The statements of assessment can do any of several things:

- *Define tools or strategies that industry could use to assess the level of competency a worker has attained in a particular critical work function.*
- *Define for trainers and educators how to assess the level of competency a student has attained relevant to the critical work function.*
- *Define the level of mastery of the critical work function that indicates that a worker or student has achieved an entry-, intermediate-, or advanced level of mastery of a critical work function.*

Tools & Strategy: The assessment process should include one or more of the following:

A. Written tests could include:
(1) Multiple choice and essay questions that demonstrate an understanding of knowledge being assessed.
(2) Graphic representations (e.g. P&IDs and loop drawings) that reveal an understanding of symbology and connections between processes and devices.
(3) Preparation and justification of a reasonable solution to a problem scenario.

B. Hands-on exercises or simulations to demonstrate acquisition of knowledge, skills and attitudes that could:
(1) Represent a real life scenario, problem or challenging situation in the context of a work environment.
(2) Apply relevant knowledge or skills.
(3) Focus on the application of knowledge and skills to a new situation.
(4) Demonstrate an ability to plan, organize and create a product or an event.
(5) Illustrate by individual performance the attained levels of knowledge, skills and attitudes.
(6)Include observation of events, groups and individuals that focuses on the relevant traits of the skill or attitude being observed.

Occupational Title: Chemical/Refining Process Technician					
Critical Work Function 5. Control Waste Treatment/Destruction Systems		**Occupational Skills, Knowledge & Conditions**			
Key Activity	**Performance Criteria**	**Occupational Skills & Knowledge**	**Conditions**		
5.1 Monitor and regulate thermal oxidation system	5.1.1 Process variables meet/do not exceed company/government specifications. 5.1.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities and other resources. 5.1.3 Product/process meets established process specifications. 5.1.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations. 5.1.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction. 5.1.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy. 5.1.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy. 5.1.8 Process variables meet product and equipment parameters.	Process Variables Operating Parameters System Components SHE (Safety, Health, & Environment) Instrumentation and Control Systems Troubleshooting Waste Incineration Personal Protective and/or Safety Equipment Operations	Drums Hoses Compressors Extruders Flares Boilers Cryogenic unit Economizer Switch gears Skimmers Steam traps Gloves Respirator Acid suit Ear muffs SCBA (Self-Contained Breathing Apparatus) Face shield Motor control centers Reverse osmosis unit Safety goggles/glasses Drum dolly Pumps (centrifugal, vacuum, positive displacement) Drivers (such as electrical motors, steam turbines, gas turbines, air drivers) Piping Scrubbers	Valves Filters Demisters Condenser Generators Transformers Aerators Clarifiers Fork lift Hand truck Slicker suit Hard hat Eyewash fountain FRCs (Flame Retardant Clothing) Thermal suit Furnaces/fired heaters Fire extinguisher Metatarsal guard Control valve (regulator) Instrumentation (analyzers, gauges, control loops, temperature sensing devices) Tools (such as sample thief, strapping tape, pipe wrench, channel locks, valve wrenches) Tubing Tanks Resins Cooling towers	Dryers Eductors Meters Incinerator Basins pH meters Superheaters Safety boots Ear plugs Safety shower First aid kit Fire monitors Tower (tray, packed) API separators/traps Microfiltration equipment Desuperheaters Heat exchangers (coolers, reboilers, fans) Heat recovery steam generator (waste heat boiler) Reactors (batch stirred tank or continuous stirred tank, fixed bed catalyst or fluidized bed catalyst) Fittings Safety harness Personal lift Computers UPS (uninterruptible power source)

Occupational Title: Chemical/Refining Process Technician					
Critical Work Function 5. Control Waste Treatment/Destruction Systems		**Occupational Skills, Knowledge & Conditions**			
Key Activity	**Performance Criteria**	**Occupational Skills & Knowledge**	**Conditions**		
5.2 Monitor and regulate flare system	5.2.1 Process variables meet/do not exceed company/government specifications. 5.2.2 Emissions meet/do not exceed company/government specifications. 5.2.3 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities and other resources. 5.2.4 Product/process meets established process specifications. 5.2.5 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations. 5.2.6 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction. 5.2.7 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy. 5.2.8 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy. 5.2.9 Process variables meet product and equipment parameters.	Process Variables Operating Parameters System Components SHE (Safety, Health, & Environment) Instrumentation and Control Systems Troubleshooting Flare Equipment Monitoring Personal Protective and/or Safety Equipment Operations Natural Gas	Drums Hoses Compressors Extruders Flares Boilers Cryogenic unit Economizer Switch gears Skimmers Steam traps Gloves Respirator Acid suit Ear muffs SCBA (Self-Contained Breathing Apparatus) Face shield Motor control centers Reverse osmosis unit Safety goggles/glasses Drum dolly Pumps (centrifugal, vacuum, positive displacement) Drivers (such as electrical motors, steam turbines, gas turbines, air drivers) Piping Scrubbers	Valves Filters Demisters Condenser Generators Transformers Aerators Clarifiers Fork lift Hand truck Slicker suit Hard hat Eyewash fountain FRCs (Flame Retardant Clothing) Thermal suit Furnaces/fired heaters Fire extinguisher Metatarsal guard Control valve (regulator) Instrumentation (analyzers, gauges, control loops, temperature sensing devices) Tools (such as sample thief, strapping tape, pipe wrench, channel locks, valve wrenches) Tubing Tanks Resins Cooling towers	Dryers Eductors Meters Incinerator Basins pH meters Superheaters Safety boots Ear plugs Safety shower First aid kit Fire monitors Tower (tray, packed) API separators/traps Microfiltration equipment Desuperheaters Heat exchangers (coolers, reboilers, fans) Heat recovery steam generator (waste heat boiler) Reactors (batch stirred tank or continuous stirred tank, fixed bed catalyst or fluidized bed catalyst) Fittings Safety harness Personal lift Computers UPS (uninterruptible power source)

Occupational Title: Chemical/Refining Process Technician					
Critical Work Function 5. Control Waste Treatment/Destruction Systems		**Occupational Skills, Knowledge & Conditions**			
Key Activity	**Performance Criteria**	**Occupational Skills & Knowledge**	**Conditions**		
5.3 Monitor and regulate storm water system	5.3.1 Storm water treatment meets established company/government specifications. 5.3.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities and other resources. 5.3.3 Product/process meets established process specifications. 5.3.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations. 5.3.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction. 5.3.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy. 5.3.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy. 5.3.8 Process variables meet product and equipment parameters.	Process Variables Operating Parameters System Components SHE (Safety, Health, & Environment) Troubleshooting Process Symbols and/or Drawings Storm Water Material Sampling Equipment Monitoring Personal Protective and/or Safety Equipment Operations	Drums Hoses Compressors Extruders Flares Boilers Cryogenic unit Economizer Switch gears Skimmers Steam traps Gloves Respirator Acid suit Ear muffs SCBA (Self-Contained Breathing Apparatus) Face shield Motor control centers Reverse osmosis unit Safety goggles/glasses Drum dolly Pumps (centrifugal, vacuum, positive displacement) Drivers (such as electrical motors, steam turbines, gas turbines, air drivers) Piping Scrubbers	Valves Filters Demisters Condenser Generators Transformers Aerators Clarifiers Fork lift Hand truck Slicker suit Hard hat Eyewash fountain FRCs (Flame Retardant Clothing) Thermal suit Furnaces/fired heaters Fire extinguisher Metatarsal guard Control valve (regulator) Instrumentation (analyzers, gauges, control loops, temperature sensing devices) Tools (such as sample thief, strapping tape, pipe wrench, channel locks, valve wrenches) Tubing Tanks Resins Cooling towers	Dryers Eductors Meters Incinerator Basins pH meters Superheaters Safety boots Ear plugs Safety shower First aid kit Fire monitors Tower (tray, packed) API separators/traps Microfiltration equipment Desuperheaters Heat exchangers (coolers, reboilers, fans) Heat recovery steam generator (waste heat boiler) Reactors (batch stirred tank or continuous stirred tank, fixed bed catalyst or fluidized bed catalyst) Fittings Safety harness Personal lift Computers UPS (uninterruptible power source)

Occupational Title: Chemical/Refining Process Technician					
Critical Work Function 5. Control Waste Treatment/Destruction Systems		**Occupational Skills, Knowledge & Conditions**			
Key Activity	**Performance Criteria**	**Occupational Skills & Knowledge**	**Conditions**		
5.4 Monitor and regulate waste water system	5.4.1 Waste stream meets/does not exceed established company/government specifications. 5.4.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities and other resources. 5.4.3 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations. 5.4.4 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction. 5.4.5 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy. 5.4.6 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy. 5.4.7 Process variables meet product and equipment parameters.	Process Variables Operating Parameters System Components SHE (Safety, Health, & Environment) Instrumentation and Control Systems Troubleshooting Waste Water Material Sampling Equipment Monitoring Personal Protective and/or Safety Equipment Operations	Drums Hoses Compressors Extruders Flares Boilers Cryogenic unit Economizer Switch gears Skimmers Steam traps Gloves Respirator Acid suit Ear muffs SCBA (Self-Contained Breathing Apparatus) Face shield Motor control centers Reverse osmosis unit Safety goggles/glasses Drum dolly Pumps (centrifugal, vacuum, positive displacement) Drivers (such as electrical motors, steam turbines, gas turbines, air drivers) Piping Scrubbers	Valves Filters Demisters Condenser Generators Transformers Aerators Clarifiers Fork lift Hand truck Slicker suit Hard hat Eyewash fountain FRCs (Flame Retardant Clothing) Thermal suit Furnaces/fired heaters Fire extinguisher Metatarsal guard Control valve (regulator) Instrumentation (analyzers, gauges, control loops, temperature sensing devices) Tools (such as sample thief, strapping tape, pipe wrench, channel locks, valve wrenches) Tubing Tanks Resins Cooling towers	Dryers Eductors Meters Incinerator Basins pH meters Superheaters Safety boots Ear plugs Safety shower First aid kit Fire monitors Tower (tray, packed) API separators/traps Microfiltration equipment Desuperheaters Heat exchangers (coolers, reboilers, fans) Heat recovery steam generator (waste heat boiler) Reactors (batch stirred tank or continuous stirred tank, fixed bed catalyst or fluidized bed catalyst) Fittings Safety harness Personal lift Computers UPS (uninterruptible power source)

CHEMICAL / REFINING PROCESS TECHNICIAN SKILL STANDARDS

Academic and Employability Knowledge and Skill Matrix for Critical Work Function 5: Control Waste Treatment/Destruction Systems

On a scale of 1 (lowest) to 5 (highest), identify the level of complexity required in each of these skills for the worker to perform the critical work function. Keep in mind that this scale is not for rating an individual's proficiency. It is intended only for rating the level of complexity required to do the work.

Occupational Title: Chemical/Refining Process Technician																
CWF 5 Control Waste Treatment and/or Destruction Systems																
Listening	Speaking	Using Information and Communication Technology	Gathering and analyzing Information	Analyzing and Solving Problems	Making Decisions and Judgments	Organizing and Planning	Using Social Skills	Adaptability	Working in Teams	Leading Others	Building Consensus	Self and Career Development	Writing	Reading	Mathematics	Science
3	3	2	2	3	3	3	4	4	3	2	3	3	3	3	2	2

Statement of Assessment for Critical Work Function 5:

The statements of assessment can do any of several things:

- *Define tools or strategies that industry could use to assess the level of competency a worker has attained in a particular critical work function.*
- *Define for trainers and educators how to assess the level of competency a student has attained relevant to the critical work function.*
- *Define the level of mastery of the critical work function that indicates that a worker or student has achieved an entry-, intermediate-, or advanced level of mastery of a critical work function.*

Tools & Strategy: The assessment process should include one or more of the following:

A. Written tests could include:
(1) Multiple choice and essay questions that demonstrate an understanding of knowledge being assessed.
(2) Graphic representations (e.g. P&IDs and loop drawings) that reveal an understanding of symbology and connections between processes and devices.
(3) Preparation and justification of a reasonable solution to a problem scenario.

B. Hands-on exercises or simulations to demonstrate acquisition of knowledge, skills and attitudes that could:
(1) Represent a real life scenario, problem or challenging situation in the context of a work environment.
(2) Apply relevant knowledge or skills.
(3) Focus on the application of knowledge and skills to a new situation.
(4) Demonstrate an ability to plan, organize and create a product or an event.
(5) Illustrate by individual performance the attained levels of knowledge, skills and attitudes.
(6)Include observation of events, groups and individuals that focuses on the relevant traits of the skill or attitude being observed.

Occupational Title: Chemical/Refining Process Technician Skill Standards					
Critical Work Function 6. Control Utility Systems		**Occupational Skills, Knowledge & Conditions**			
Key Activity	**Performance Criteria**	**Occupational Skills & Knowledge**	**Conditions**		
6.1 Monitor and regulate instrument air system	6.1.1 Production rates meet desired instrument air pressure per established company/equipment specifications. 6.1.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities and other resources. 6.1.3 Product/process meets established process specifications 6.1.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations. 6.1.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction. 6.1.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy. 6.1.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy. 6.1.8 Process variables meet product and equipment parameters.	Process Variables Operating Parameters System Components SHE (Safety, Health, & Environment) Instrumentation and Control Systems Troubleshooting Process Symbols and/or Drawings Instrument Air Equipment Monitoring Personal Protective and/or Safety Equipment Operations	Drums Hoses Compressors Extruders Flares Boilers Cryogenic unit Economizer Switch gears Skimmers Steam traps Gloves Respirator Acid suit Ear muffs SCBA (Self-Contained Breathing Apparatus) Face shield Motor control centers Reverse osmosis unit Safety goggles/glasses Drum dolly Pumps (centrifugal, vacuum, positive displacement) Drivers (such as electrical motors, steam turbines, gas turbines, air drivers) Piping Scrubbers	Valves Filters Demisters Condenser Generators Transformers Aerators Clarifiers Fork lift Hand truck Slicker suit Hard hat Eyewash fountain FRCs (Flame Retardant Clothing) Thermal suit Furnaces/fired heaters Fire extinguisher Metatarsal guard Control valve (regulator) Instrumentation (analyzers, gauges, control loops, temperature sensing devices) Tools (such as sample thief, strapping tape, pipe wrench, channel locks, valve wrenches) Tubing Tanks Resins Cooling towers	Dryers Eductors Meters Incinerator Basins pH meters Superheaters Safety boots Ear plugs Safety shower First aid kit Fire monitors Tower (tray, packed) API separators/traps Microfiltration equipment Desuperheaters Heat exchangers (coolers, reboilers, fans) Heat recovery steam generator (waste heat boiler) Reactors (batch stirred tank or continuous stirred tank, fixed bed catalyst or fluidized bed catalyst) Fittings Safety harness Personal lift Computers UPS (uninterruptible power source)

Occupational Title: Chemical/Refining Process Technician Skill Standards					
Critical Work Function 6. Control Utility Systems		**Occupational Skills, Knowledge & Conditions**			
Key Activity	**Performance Criteria**	**Occupational Skills & Knowledge**	**Conditions**		
6.2 Monitor and regulate utility air system	6.2.1 Production rates meet desired utility air pressure per established company/equipment specifications. 6.2.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities and other resources. 6.2.3 Product/process meets established process specifications 6.2.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations. 6.2.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction. 6.2.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy. 6.2.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy. 6.2.8 Process variables meet product and equipment parameters.	Process Variables Operating Parameters System Components SHE (Safety, Health, & Environment) Instrumentation and Control Systems Troubleshooting Process Symbols and/or Drawings Utility Air Equipment Monitoring Personal Protective and/or Safety Equipment Operations	Drums Hoses Compressors Extruders Flares Boilers Cryogenic unit Economizer Switch gears Skimmers Steam traps Gloves Respirator Acid suit Ear muffs SCBA (Self-Contained Breathing Apparatus) Face shield Motor control centers Reverse osmosis unit Safety goggles/glasses Drum dolly Pumps (centrifugal, vacuum, positive displacement) Drivers (such as electrical motors, steam turbines, gas turbines, air drivers) Piping Scrubbers	Valves Filters Demisters Condenser Generators Transformers Aerators Clarifiers Fork lift Hand truck Slicker suit Hard hat Eyewash fountain FRCs (Flame Retardant Clothing) Thermal suit Furnaces/fired heaters Fire extinguisher Metatarsal guard Control valve (regulator) Instrumentation (analyzers, gauges, control loops, temperature sensing devices) Tools (such as sample thief, strapping tape, pipe wrench, channel locks, valve wrenches) Tubing Tanks Resins Cooling towers	Dryers Eductors Meters Incinerator Basins pH meters Superheaters Safety boots Ear plugs Safety shower First aid kit Fire monitors Tower (tray, packed) API separators/traps Microfiltration equipment Desuperheaters Heat exchangers (coolers, reboilers, fans) Heat recovery steam generator (waste heat boiler) Reactors (batch stirred tank or continuous stirred tank, fixed bed catalyst or fluidized bed catalyst) Fittings Safety harness Personal lift Computers UPS (uninterruptible power source)

Occupational Title: Chemical/Refining Process Technician Skill Standards					
Critical Work Function 6. Control Utility Systems		**Occupational Skills, Knowledge & Conditions**			
Key Activity	**Performance Criteria**	**Occupational Skills & Knowledge**	**Conditions**		
6.3 Monitor and regulate process water system	6.3.1 Production rates meet desired level per established company specifications. 6.3.2 Product/process meets established process specifications. 6.3.3 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations. 6.3.4 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction. 6.3.5 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy. 6.3.6 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy. 6.3.7 Process variables meet product and equipment parameters.	Process Variables Operating Parameters System Components SHE (Safety, Health, & Environment) Instrumentation and Control Systems Troubleshooting Process Symbols and/or Drawings Material Sampling Equipment Monitoring Personal Protective and/or Safety Equipment Operations	Drums Hoses Compressors Extruders Flares Boilers Cryogenic unit Economizer Switch gears Skimmers Steam traps Gloves Respirator Acid suit Ear muffs SCBA (Self-Contained Breathing Apparatus) Face shield Motor control centers Reverse osmosis unit Safety goggles/glasses Drum dolly Pumps (centrifugal, vacuum, positive displacement) Drivers (such as electrical motors, steam turbines, gas turbines, air drivers) Piping Scrubbers	Valves Filters Demisters Condenser Generators Transformers Aerators Clarifiers Fork lift Hand truck Slicker suit Hard hat Eyewash fountain FRCs (Flame Retardant Clothing) Thermal suit Furnaces/fired heaters Fire extinguisher Metatarsal guard Control valve (regulator) Instrumentation (analyzers, gauges, control loops, temperature sensing devices) Tools (such as sample thief, strapping tape, pipe wrench, channel locks, valve wrenches) Tubing Tanks Resins Cooling towers	Dryers Eductors Meters Incinerator Basins pH meters Superheaters Safety boots Ear plugs Safety shower First aid kit Fire monitors Tower (tray, packed) API separators/traps Microfiltration equipment Desuperheaters Heat exchangers (coolers, reboilers, fans) Heat recovery steam generator (waste heat boiler) Reactors (batch stirred tank or continuous stirred tank, fixed bed catalyst or fluidized bed catalyst) Fittings Safety harness Personal lift Computers UPS (uninterruptible power source)

Occupational Title: Chemical/Refining Process Technician Skill Standards					
Critical Work Function 6. Control Utility Systems		**Occupational Skills, Knowledge & Conditions**			
Key Activity	**Performance Criteria**	**Occupational Skills & Knowledge**	**Conditions**		
6.4 Monitor and regulate potable water system	6.4.1 Production rates meet desired potable water pressure per company specifications. 6.4.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities, and other resources. 6.4.3 Potable water meets company/government specifications. 6.4.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations. 6.4.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction. 6.4.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy. 6.4.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy. 6.4.8 Process variables meet product and equipment parameters.	Process Variables Operating Parameters System Components SHE (Safety, Health, & Environment) Instrumentation and Control Systems Troubleshooting Process Symbols and/or Drawings Potable Water Material Sampling Equipment Monitoring Personal Protective and/or Safety Equipment Operations	Drums Hoses Compressors Extruders Flares Boilers Cryogenic unit Economizer Switch gears Skimmers Steam traps Gloves Respirator Acid suit Ear muffs SCBA (Self-Contained Breathing Apparatus) Face shield Motor control centers Reverse osmosis unit Safety goggles/glasses Drum dolly Pumps (centrifugal, vacuum, positive displacement) Drivers (such as electrical motors, steam turbines, gas turbines, air drivers) Piping Scrubbers	Valves Filters Demisters Condenser Generators Transformers Aerators Clarifiers Fork lift Hand truck Slicker suit Hard hat Eyewash fountain FRCs (Flame Retardant Clothing) Thermal suit Furnaces/fired heaters Fire extinguisher Metatarsal guard Control valve (regulator) Instrumentation (analyzers, gauges, control loops, temperature sensing devices) Tools (such as sample thief, strapping tape, pipe wrench, channel locks, valve wrenches) Tubing Tanks Resins Cooling towers	Dryers Eductors Meters Incinerator Basins pH meters Superheaters Safety boots Ear plugs Safety shower First aid kit Fire monitors Tower (tray, packed) API separators/traps Microfiltration equipment Desuperheaters Heat exchangers (coolers, reboilers, fans) Heat recovery steam generator (waste heat boiler) Reactors (batch stirred tank or continuous stirred tank, fixed bed catalyst or fluidized bed catalyst) Fittings Safety harness Personal lift Computers UPS (uninterruptible power source)

Occupational Title: Chemical/Refining Process Technician Skill Standards					
Critical Work Function 6. Control Utility Systems		**Occupational Skills, Knowledge & Conditions**			
Key Activity	**Performance Criteria**	**Occupational Skills & Knowledge**	**Conditions**		
6.5 Monitor and regulate fire water system	6.5.1 Fire water flow rates meet desired level per company specifications. 6.5.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities, and other resources. 6.5.3 Fire water meets established process specifications. 6.5.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations. 6.5.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction. 6.5.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy. 6.5.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy. 6.5.8 Process variables meet product and equipment parameters.	Process Variables Operating Parameters System Components SHE (Safety, Health, & Environment) Instrumentation and Control Systems Troubleshooting Process Symbols and/or Drawings Fire Water Equipment Monitoring Personal Protective and/or Safety Equipment Operations	Drums Hoses Compressors Extruders Flares Boilers Cryogenic unit Economizer Switch gears Skimmers Steam traps Gloves Respirator Acid suit Ear muffs SCBA (Self-Contained Breathing Apparatus) Face shield Motor control centers Reverse osmosis unit Safety goggles/glasses Drum dolly Pumps (centrifugal, vacuum, positive displacement) Drivers (such as electrical motors, steam turbines, gas turbines, air drivers) Piping Scrubbers	Valves Filters Demisters Condenser Generators Transformers Aerators Clarifiers Fork lift Hand truck Slicker suit Hard hat Eyewash fountain FRCs (Flame Retardant Clothing) Thermal suit Furnaces/fired heaters Fire extinguisher Metatarsal guard Control valve (regulator) Instrumentation (analyzers, gauges, control loops, temperature sensing devices) Tools (such as sample thief, strapping tape, pipe wrench, channel locks, valve wrenches) Tubing Tanks Resins Cooling towers	Dryers Eductors Meters Incinerator Basins pH meters Superheaters Safety boots Ear plugs Safety shower First aid kit Fire monitors Tower (tray, packed) API separators/traps Microfiltration equipment Desuperheaters Heat exchangers (coolers, reboilers, fans) Heat recovery steam generator (waste heat boiler) Reactors (batch stirred tank or continuous stirred tank, fixed bed catalyst or fluidized bed catalyst) Fittings Safety harness Personal lift Computers UPS (uninterruptible power source)

Occupational Title: Chemical/Refining Process Technician Skill Standards					
Critical Work Function 6. Control Utility Systems		**Occupational Skills, Knowledge & Conditions**			
Key Activity	**Performance Criteria**	**Occupational Skills & Knowledge**	**Conditions**		
6.6 Monitor and regulate service water system	6.6.1 Service water flow rates meet desired rates per company specifications. 6.6.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities, and other resources. 6.6.3 Service water meets established process specifications. 6.6.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations. 6.6.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction. 6.6.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy. 6.6.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy. 6.6.8 Process variables meet product and equipment parameters	Process Variables Operating Parameters System Components SHE (Safety, Health, & Environment) Instrumentation and Control Systems Troubleshooting Process Symbols and/or Drawings Service Water Material Sampling Equipment Monitoring Personal Protective and/or Safety Equipment Operations	Drums Hoses Compressors Extruders Flares Boilers Cryogenic unit Economizer Switch gears Skimmers Steam traps Gloves Respirator Acid suit Ear muffs SCBA (Self-Contained Breathing Apparatus) Face shield Motor control centers Reverse osmosis unit Safety goggles/glasses Drum dolly Pumps (centrifugal, vacuum, positive displacement) Drivers (such as electrical motors, steam turbines, gas turbines, air drivers) Piping Scrubbers	Valves Filters Demisters Condenser Generators Transformers Aerators Clarifiers Fork lift Hand truck Slicker suit Hard hat Eyewash fountain FRCs (Flame Retardant Clothing) Thermal suit Furnaces/fired heaters Fire extinguisher Metatarsal guard Control valve (regulator) Instrumentation (analyzers, gauges, control loops, temperature sensing devices) Tools (such as sample thief, strapping tape, pipe wrench, channel locks, valve wrenches) Tubing Tanks Resins Cooling towers	Dryers Eductors Meters Incinerator Basins pH meters Superheaters Safety boots Ear plugs Safety shower First aid kit Fire monitors Tower (tray, packed) API separators/traps Microfiltration equipment Desuperheaters Heat exchangers (coolers, reboilers, fans) Heat recovery steam generator (waste heat boiler) Reactors (batch stirred tank or continuous stirred tank, fixed bed catalyst or fluidized bed catalyst) Fittings Safety harness Personal lift Computers UPS (uninterruptible power source)

Occupational Title: Chemical/Refining Process Technician Skill Standards					
Critical Work Function 6. Control Utility Systems		**Occupational Skills, Knowledge & Conditions**			
Key Activity	**Performance Criteria**	**Occupational Skills & Knowledge**	**Conditions**		
6.7 Monitor and regulate boiler feed water	6.7.1 Production rates meet desired production level per process/equipment specifications. 6.7.2 Feed water meets established process specifications. 6.7.3 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities, and other resources. 6.7.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations. 6.7.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction. 6.7.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy. 6.7.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy. 6.7.8 Process variables meet product and equipment parameters	Process Variables Operating Parameters System Components SHE (Safety, Health, & Environment) Instrumentation and Control Systems Troubleshooting Boilers Steam Generation Material Sampling Personal Protective and/or Safety Equipment Operations Boiler Feed Water Steam Condensate	Drums Hoses Compressors Extruders Flares Boilers Cryogenic unit Economizer Switch gears Skimmers Steam traps Gloves Respirator Acid suit Ear muffs SCBA (Self-Contained Breathing Apparatus) Face shield Motor control centers Reverse osmosis unit Safety goggles/glasses Drum dolly Pumps (centrifugal, vacuum, positive displacement) Drivers (such as electrical motors, steam turbines, gas turbines, air drivers) Piping Scrubbers	Valves Filters Demisters Condenser Generators Transformers Aerators Clarifiers Fork lift Hand truck Slicker suit Hard hat Eyewash fountain FRCs (Flame Retardant Clothing) Thermal suit Furnaces/fired heaters Fire extinguisher Metatarsal guard Control valve (regulator) Instrumentation (analyzers, gauges, control loops, temperature sensing devices) Tools (such as sample thief, strapping tape, pipe wrench, channel locks, valve wrenches) Tubing Tanks Resins Cooling towers	Dryers Eductors Meters Incinerator Basins pH meters Superheaters Safety boots Ear plugs Safety shower First aid kit Fire monitors Tower (tray, packed) API separators/traps Microfiltration equipment Desuperheaters Heat exchangers (coolers, reboilers, fans) Heat recovery steam generator (waste heat boiler) Reactors (batch stirred tank or continuous stirred tank, fixed bed catalyst or fluidized bed catalyst) Fittings Safety harness Personal lift Computers UPS (uninterruptible power source)

Occupational Title: Chemical/Refining Process Technician Skill Standards					
Critical Work Function 6. Control Utility Systems		**Occupational Skills, Knowledge & Conditions**			
Key Activity	**Performance Criteria**	**Occupational Skills & Knowledge**	**Conditions**		
6.8 Monitor and regulate condensate system	6.8.1 Production rates meet desired production level per process/equipment specifications. 6.8.2 Condensate meets established process specifications. 6.8.3 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities, and other resources. 6.8.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations. 6.8.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction. 6.8.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy. 6.8.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy. 6.8.8 Process variables meet product and equipment parameters	Process Variables Operating Parameters System Components SHE (Safety, Health, & Environment) Instrumentation and Control Systems Troubleshooting Process Symbols and/or Drawings Material Sampling Personal Protective and/or Safety Equipment Operations Boiler Feed Water Steam Condensate	Drums Hoses Compressors Extruders Flares Boilers Cryogenic unit Economizer Switch gears Skimmers Steam traps Gloves Respirator Acid suit Ear muffs SCBA (Self-Contained Breathing Apparatus) Face shield Motor control centers Reverse osmosis unit Safety goggles/glasses Drum dolly Pumps (centrifugal, vacuum, positive displacement) Drivers (such as electrical motors, steam turbines, gas turbines, air drivers) Piping Scrubbers	Valves Filters Demisters Condenser Generators Transformers Aerators Clarifiers Fork lift Hand truck Slicker suit Hard hat Eyewash fountain FRCs (Flame Retardant Clothing) Thermal suit Furnaces/fired heaters Fire extinguisher Metatarsal guard Control valve (regulator) Instrumentation (analyzers, gauges, control loops, temperature sensing devices) Tools (such as sample thief, strapping tape, pipe wrench, channel locks, valve wrenches) Tubing Tanks Resins Cooling towers	Dryers Eductors Meters Incinerator Basins pH meters Superheaters Safety boots Ear plugs Safety shower First aid kit Fire monitors Tower (tray, packed) API separators/traps Microfiltration equipment Desuperheaters Heat exchangers (coolers, reboilers, fans) Heat recovery steam generator (waste heat boiler) Reactors (batch stirred tank or continuous stirred tank, fixed bed catalyst or fluidized bed catalyst) Fittings Safety harness Personal lift Computers UPS (uninterruptible power source)

Occupational Title: Chemical/Refining Process Technician Skill Standards					
Critical Work Function 6. Control Utility Systems		**Occupational Skills, Knowledge & Conditions**			
Key Activity	**Performance Criteria**	**Occupational Skills & Knowledge**	**Conditions**		
6.9 Monitor and regulate natural gas system	6.9.1 Production rates meet desired level per process/equipment specifications. 6.9.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities, and other resources. 6.9.3 Natural gas usage meets company established cost criteria. 6.9.4 Natural gas meets established product specifications. 6.9.5 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations. 6.9.6 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction. 6.9.7 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy. 6.9.8 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy. 6.9.9 Process variables meet product and equipment parameters	Process Variables Operating Parameters System Components SHE (Safety, Health, & Environment) Instrumentation and Control Systems Troubleshooting Process Symbols and/or Drawings Equipment Monitoring Personal Protective and/or Safety Equipment Operations Natural Gas	Drums Hoses Compressors Extruders Flares Boilers Cryogenic unit Economizer Switch gears Skimmers Steam traps Gloves Respirator Acid suit Ear muffs SCBA (Self-Contained Breathing Apparatus) Face shield Motor control centers Reverse osmosis unit Safety goggles/glasses Drum dolly Pumps (centrifugal, vacuum, positive displacement) Drivers (such as electrical motors, steam turbines, gas turbines, air drivers) Piping Scrubbers	Valves Filters Demisters Condenser Generators Transformers Aerators Clarifiers Fork lift Hand truck Slicker suit Hard hat Eyewash fountain FRCs (Flame Retardant Clothing) Thermal suit Furnaces/fired heaters Fire extinguisher Metatarsal guard Control valve (regulator) Instrumentation (analyzers, gauges, control loops, temperature sensing devices) Tools (such as sample thief, strapping tape, pipe wrench, channel locks, valve wrenches) Tubing Tanks Resins Cooling towers	Dryers Eductors Meters Incinerator Basins pH meters Superheaters Safety boots Ear plugs Safety shower First aid kit Fire monitors Tower (tray, packed) API separators/traps Microfiltration equipment Desuperheaters Heat exchangers (coolers, reboilers, fans) Heat recovery steam generator (waste heat boiler) Reactors (batch stirred tank or continuous stirred tank, fixed bed catalyst or fluidized bed catalyst) Fittings Safety harness Personal lift Computers UPS (uninterruptible power source)

Occupational Title: Chemical/Refining Process Technician Skill Standards					
Critical Work Function 6. Control Utility Systems		**Occupational Skills, Knowledge & Conditions**			
Key Activity	**Performance Criteria**	**Occupational Skills & Knowledge**	**Conditions**		
6.10 Monitor and regulate fuel gas system	6.10.1 Process flow meets/does not exceed company/government specifications. 6.10.2 Operation meets company established cost criteria 6.10.3 Operation meets established process specifications. 6.10.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations. 6.10.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction. 6.10.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy. 6.10.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy. 6.10.8 Process variables meet product and equipment parameters	Process Variables Operating Parameters System Components SHE (Safety, Health, & Environment) Instrumentation and Control Systems Troubleshooting Process Symbols and/or Drawings Equipment Monitoring Personal Protective and/or Safety Equipment Operations Fuel Gas	Drums Hoses Compressors Extruders Flares Boilers Cryogenic unit Economizer Switch gears Skimmers Steam traps Gloves Respirator Acid suit Ear muffs SCBA (Self-Contained Breathing Apparatus) Face shield Motor control centers Reverse osmosis unit Safety goggles/glasses Drum dolly Pumps (centrifugal, vacuum, positive displacement) Drivers (such as electrical motors, steam turbines, gas turbines, air drivers) Piping Scrubbers	Valves Filters Demisters Condenser Generators Transformers Aerators Clarifiers Fork lift Hand truck Slicker suit Hard hat Eyewash fountain FRCs (Flame Retardant Clothing) Thermal suit Furnaces/fired heaters Fire extinguisher Metatarsal guard Control valve (regulator) Instrumentation (analyzers, gauges, control loops, temperature sensing devices) Tools (such as sample thief, strapping tape, pipe wrench, channel locks, valve wrenches) Tubing Tanks Resins Cooling towers	Dryers Eductors Meters Incinerator Basins pH meters Superheaters Safety boots Ear plugs Safety shower First aid kit Fire monitors Tower (tray, packed) API separators/traps Microfiltration equipment Desuperheaters Heat exchangers (coolers, reboilers, fans) Heat recovery steam generator (waste heat boiler) Reactors (batch stirred tank or continuous stirred tank, fixed bed catalyst or fluidized bed catalyst) Fittings Safety harness Personal lift Computers UPS (uninterruptible power source)

Occupational Title: Chemical/Refining Process Technician Skill Standards					
Critical Work Function 6. Control Utility Systems		**Occupational Skills, Knowledge & Conditions**			
Key Activity	**Performance Criteria**	**Occupational Skills & Knowledge**	**Conditions**		
6.11 Monitor and regulate nitrogen system	6.11.1 Nitrogen rates meet desired level per process/equipment specifications. 6.11.2 Nitrogen usage meets company established cost criteria 6.11.3 Nitrogen meets established product specifications. 6.11.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations. 6.11.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction. 6.11.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy. 6.11.7 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy. 6.11.8 Process variables meet product and equipment parameters	Operating Parameters SHE (Safety, Health, & Environment) Instrumentation and Control Systems Troubleshooting Equipment Monitoring Personal Protective and/or Safety Equipment Operations Nitrogen	Drums Hoses Compressors Extruders Flares Boilers Cryogenic unit Economizer Switch gears Skimmers Steam traps Gloves Respirator Acid suit Ear muffs SCBA (Self-Contained Breathing Apparatus) Face shield Motor control centers Reverse osmosis unit Safety goggles/glasses Drum dolly Pumps (centrifugal, vacuum, positive displacement) Drivers (such as electrical motors, steam turbines, gas turbines, air drivers) Piping Scrubbers	Valves Filters Demisters Condenser Generators Transformers Aerators Clarifiers Fork lift Hand truck Slicker suit Hard hat Eyewash fountain FRCs (Flame Retardant Clothing) Thermal suit Furnaces/fired heaters Fire extinguisher Metatarsal guard Control valve (regulator) Instrumentation (analyzers, gauges, control loops, temperature sensing devices) Tools (such as sample thief, strapping tape, pipe wrench, channel locks, valve wrenches) Tubing Tanks Resins Cooling towers	Dryers Eductors Meters Incinerator Basins pH meters Superheaters Safety boots Ear plugs Safety shower First aid kit Fire monitors Tower (tray, packed) API separators/traps Microfiltration equipment Desuperheaters Heat exchangers (coolers, reboilers, fans) Heat recovery steam generator (waste heat boiler) Reactors (batch stirred tank or continuous stirred tank, fixed bed catalyst or fluidized bed catalyst) Fittings Safety harness Personal lift Computers UPS (uninterruptible power source)

CHEMICAL / REFINING PROCESS TECHNICIAN SKILL STANDARDS

Academic and Employability Knowledge and Skill Matrix for Critical Work Function 6: Control Utility Systems

On a scale of 1 (lowest) to 5 (highest), identify the level of complexity required in each of these skills for the worker to perform the critical work function. Keep in mind that this scale is not for rating an individual's proficiency. It is intended only for rating the level of complexity required to do the work.

Occupational Title: Chemical/Refining Process Technician																
CWF 6 Control Utility Systems																
Listening	Speaking	Using Information and Communication Technology	Gathering and analyzing Information	Analyzing and Solving Problems	Making Decisions and Judgments	Organizing and Planning	Using Social Skills	Adaptability	Working in Teams	Leading Others	Building Consensus	Self and Career Development	Writing	Reading	Mathematics	Science
4	3	2	2	4	3	3	4	4	3	2	3	3	3	4	2	3

Statement of Assessment for Critical Work Function 6

The statements of assessment can do any of several things:

- *Define tools or strategies that industry could use to assess the level of competency a worker has attained in a particular critical work function.*
- *Define for trainers and educators how to assess the level of competency a student has attained relevant to the critical work function.*
- *Define the level of mastery of the critical work function that indicates that a worker or student has achieved an entry-, intermediate-, or advanced level of mastery of a critical work function.*

Tools & Strategy: The assessment process should include one or more of the following:

A. Written tests could include:

(1) Multiple choice and essay questions that demonstrate an understanding of knowledge being assessed.
(2) Graphic representations (e.g. P&IDs and loop drawings) that reveal an understanding of symbology and connections between processes and devices.
(3) Preparation and justification of a reasonable solution to a problem scenario.

B. Hands-on exercises or simulations to demonstrate acquisition of knowledge, skills and attitudes that could:

(1) Represent a real life scenario, problem or challenging situation in the context of a work environment.
(2) Apply relevant knowledge or skills.
(3) Focus on the application of knowledge and skills to a new situation.
(4) Demonstrate an ability to plan, organize and create a product or an event.
(5) Illustrate by individual performance the attained levels of knowledge, skills and attitudes.
(6)Include observation of events, groups and individuals that focuses on the relevant traits of the skill or attitude being observed.

Occupational Title: Chemical/Refining Process Technician Skill Standards					
Critical Work Function 7. Control Chemical Materials Handling and Storage		**Occupational Skills, Knowledge & Conditions**			
Key Activity	**Performance Criteria**	**Occupational Skills & Knowledge**	**Conditions**		
7.1 Receive chemical materials	7.1.1 Material composition is verified according to company specifications. 7.1.2 Material quantity is verified according to company specifications. 7.1.3 Materials are unloaded according to governmental regulation, company policies, and safe work practices.	Operating Parameters System Components SHE (Safety, Health, & Environment) Instrumentation and Control Systems Troubleshooting Process Symbols and/or Drawings Material Sampling Hazard Labeling Equipment Monitoring Inventory Control Personal Protective and/or Safety Equipment Operations	Drums Hoses Compressors Extruders Flares Boilers Cryogenic unit Economizer Switch gears Skimmers Steam traps Gloves Respirator Acid suit Ear muffs SCBA (Self-Contained Breathing Apparatus) Face shield Motor control centers Reverse osmosis unit Safety goggles/glasses Drum dolly Pumps (centrifugal, vacuum, positive displacement) Drivers (such as electrical motors, steam turbines, gas turbines, air drivers) Piping Scrubbers	Valves Filters Demisters Condenser Generators Transformers Aerators Clarifiers Fork lift Hand truck Slicker suit Hard hat Eyewash fountain FRCs (Flame Retardant Clothing) Thermal suit Furnaces/fired heaters Fire extinguisher Metatarsal guard Control valve (regulator) Instrumentation (analyzers, gauges, control loops, temperature sensing devices) Tools (such as sample thief, strapping tape, pipe wrench, channel locks, valve wrenches) Tubing Tanks Resins Cooling towers	Dryers Eductors Meters Incinerator Basins pH meters Superheaters Safety boots Ear plugs Safety shower First aid kit Fire monitors Tower (tray, packed) API separators/traps Microfiltration equipment Desuperheaters Heat exchangers (coolers, reboilers, fans) Heat recovery steam generator (waste heat boiler) Reactors (batch stirred tank or continuous stirred tank, fixed bed catalyst or fluidized bed catalyst) Fittings Safety harness Personal lift Computers UPS (uninterruptible power source)

Occupational Title: Chemical/Refining Process Technician Skill Standards					
Critical Work Function 7. Control Chemical Materials Handling and Storage		**Occupational Skills, Knowledge & Conditions**			
Key Activity	**Performance Criteria**	**Occupational Skills & Knowledge**	**Conditions**		
7.2 Store chemical materials	7.2.1 Material quantity and quality are maintained according to company parameters 7.2.2 Materials are labeled per governmental regulations and company policies.	Operating Parameters System Components SHE (Safety, Health, & Environment) Troubleshooting Process Symbols and/or Drawings Material Sampling Hazard Labeling Equipment Monitoring Inventory Control Personal Protective and/or Safety Equipment Operations	Drums Hoses Compressors Extruders Flares Boilers Cryogenic unit Economizer Switch gears Skimmers Steam traps Gloves Respirator Acid suit Ear muffs SCBA (Self-Contained Breathing Apparatus) Face shield Motor control centers Reverse osmosis unit Safety goggles/glasses Drum dolly Pumps (centrifugal, vacuum, positive displacement) Drivers (such as electrical motors, steam turbines, gas turbines, air drivers) Piping Scrubbers	Valves Filters Demisters Condenser Generators Transformers Aerators Clarifiers Fork lift Hand truck Slicker suit Hard hat Eyewash fountain FRCs (Flame Retardant Clothing) Thermal suit Furnaces/fired heaters Fire extinguisher Metatarsal guard Control valve (regulator) Instrumentation (analyzers, gauges, control loops, temperature sensing devices) Tools (such as sample thief, strapping tape, pipe wrench, channel locks, valve wrenches) Tubing Tanks Resins Cooling towers	Dryers Eductors Meters Incinerator Basins pH meters Superheaters Safety boots Ear plugs Safety shower First aid kit Fire monitors Tower (tray, packed) API separators/traps Microfiltration equipment Desuperheaters Heat exchangers (coolers, reboilers, fans) Heat recovery steam generator (waste heat boiler) Reactors (batch stirred tank or continuous stirred tank, fixed bed catalyst or fluidized bed catalyst) Fittings Safety harness Personal lift Computers UPS (uninterruptible power source)

Occupational Title: Chemical/Refining Process Technician Skill Standards					
Critical Work Function 7. Control Chemical Materials Handling and Storage		**Occupational Skills, Knowledge & Conditions**			
Key Activity	**Performance Criteria**	**Occupational Skills & Knowledge**	**Conditions**		
7.3 Transfer chemical materials	7.3.1 Specified quantity/quality of materials are transferred to process units, storage, and/or externally per government regulations, company policies, and safe work practices. 7.3.2 Materials are transferred to the specified destination according to company distribution schedule. 7.3.3 Internal and external material transfers are coordinated according to company policies and procedures.	Process Variables Operating Parameters System Components SHE (Safety, Health, & Environment) Instrumentation and Control Systems Troubleshooting Material Sampling Hazard Labeling Equipment Monitoring Inventory Control Personal Protective and/or Safety Equipment Operations	Drums Hoses Compressors Extruders Flares Boilers Cryogenic unit Economizer Switch gears Skimmers Steam traps Gloves Respirator Acid suit Ear muffs SCBA (Self-Contained Breathing Apparatus) Face shield Motor control centers Reverse osmosis unit Safety goggles/glasses Drum dolly Pumps (centrifugal, vacuum, positive displacement) Drivers (such as electrical motors, steam turbines, gas turbines, air drivers) Piping Scrubbers	Valves Filters Demisters Condenser Generators Transformers Aerators Clarifiers Fork lift Hand truck Slicker suit Hard hat Eyewash fountain FRCs (Flame Retardant Clothing) Thermal suit Furnaces/fired heaters Fire extinguisher Metatarsal guard Control valve (regulator) Instrumentation (analyzers, gauges, control loops, temperature sensing devices) Tools (such as sample thief, strapping tape, pipe wrench, channel locks, valve wrenches) Tubing Tanks Resins Cooling towers	Dryers Eductors Meters Incinerator Basins pH meters Superheaters Safety boots Ear plugs Safety shower First aid kit Fire monitors Tower (tray, packed) API separators/traps Microfiltration equipment Desuperheaters Heat exchangers (coolers, reboilers, fans) Heat recovery steam generator (waste heat boiler) Reactors (batch stirred tank or continuous stirred tank, fixed bed catalyst or fluidized bed catalyst) Fittings Safety harness Personal lift Computers UPS (uninterruptible power source)

CHEMICAL / REFINING PROCESS TECHNICIAN SKILL STANDARDS

Academic and Employability Knowledge and Skill Matrix for Critical Work Function 7: Control Chemical Materials Handling and Storage

On a scale of 1 (lowest) to 5 (highest), identify the level of complexity required in each of these skills for the worker to perform the critical work function. Keep in mind that this scale is not for rating an individual's proficiency. It is intended only for rating the level of complexity required to do the work.

Occupational Title: Chemical/Refining Process Technician																
CWF 7 Control Chemical Materials Handling and Storage																
Listening	Speaking	Using Information and Communication Technology	Gathering and analyzing Information	Analyzing and Solving Problems	Making Decisions and Judgments	Organizing and Planning	Using Social Skills	Adaptability	Working in Teams	Leading Others	Building Consensus	Self and Career Development	Writing	Reading	Mathematics	Science
3	3	2	3	4	3	2	4	3	3	2	2	2	3	4	2	2

Statement of Assessment for Critical Work Function 7

The statements of assessment can do any of several things:

- *Define tools or strategies that industry could use to assess the level of competency a worker has attained in a particular critical work function.*
- *Define for trainers and educators how to assess the level of competency a student has attained relevant to the critical work function.*
- *Define the level of mastery of the critical work function that indicates that a worker or student has achieved an entry-, intermediate-, or advanced level of mastery of a critical work function.*

Tools & Strategy: The assessment process should include one or more of the following:

A. Written tests could include:

(1) Multiple choice and essay questions that demonstrate an understanding of knowledge being assessed.
(2) Graphic representations (e.g. P&IDs and loop drawings) that reveal an understanding of symbology and connections between processes and devices.
(3) Preparation and justification of a reasonable solution to a problem scenario.

B. Hands-on exercises or simulations to demonstrate acquisition of knowledge, skills and attitudes that could:

(1) Represent a real life scenario, problem or challenging situation in the context of a work environment.
(2) Apply relevant knowledge or skills.
(3) Focus on the application of knowledge and skills to a new situation.
(4) Demonstrate an ability to plan, organize and create a product or an event.
(5) Illustrate by individual performance the attained levels of knowledge, skills and attitudes.
(6)Include observation of events, groups and individuals that focuses on the relevant traits of the skill or attitude being observed.

Occupational Title: Chemical/Refining Process Technician Skill Standards					
Critical Work Function 8. Troubleshoot Process Abnormalities and Equipment Malfunctions		**Occupational Skills, Knowledge & Conditions**			
Key Activity	**Performance Criteria**	**Occupational Skills & Knowledge**	**Conditions**		
8.1 Diagnose abnormality or malfunction	8.1.1 Abnormal condition is recognized 8.1.2 Process is stabilized as specified by company policies and procedures 8.1.3 Relevant data is collected according to data points used to determine the condition of the process or equipment under normal operators. 8.1.4 Relevant data is analyzed according to data point comparison that determines deviation from normal operating conditions. 8.1.5 Cause of malfunction or abnormality is identified.	Process Variables Operating Parameters System Components Heat and/or Material Balances SHE (Safety, Health, & Environment) Instrumentation and Control Systems Troubleshooting Process Symbols and/or Drawings Material Sampling Equipment Monitoring Personal Protective and/or Safety Equipment Operations	Drums Hoses Compressors Extruders Flares Boilers Cryogenic unit Economizer Switch gears Skimmers Steam traps Gloves Respirator Acid suit Ear muffs SCBA (Self-Contained Breathing Apparatus) Face shield Motor control centers Reverse osmosis unit Safety goggles/glasses Drum dolly Pumps (centrifugal, vacuum, positive displacement) Drivers (such as electrical motors, steam turbines, gas turbines, air drivers) Piping Scrubbers	Valves Filters Demisters Condenser Generators Transformers Aerators Clarifiers Fork lift Hand truck Slicker suit Hard hat Eyewash fountain FRCs (Flame Retardant Clothing) Thermal suit Furnaces/fired heaters Fire extinguisher Metatarsal guard Control valve (regulator) Instrumentation (analyzers, gauges, control loops, temperature sensing devices) Tools (such as sample thief, strapping tape, pipe wrench, channel locks, valve wrenches) Tubing Tanks Resins Cooling towers	Dryers Eductors Meters Incinerator Basins pH meters Superheaters Safety boots Ear plugs Safety shower First aid kit Fire monitors Tower (tray, packed) API separators/traps Microfiltration equipment Desuperheaters Heat exchangers (coolers, reboilers, fans) Heat recovery steam generator (waste heat boiler) Reactors (batch stirred tank or continuous stirred tank, fixed bed catalyst or fluidized bed catalyst) Fittings Safety harness Personal lift Computers UPS (uninterruptible power source)

Occupational Title: Chemical/Refining Process Technician Skill Standards					
Critical Work Function 8. Troubleshoot Process Abnormalities and Equipment Malfunctions		**Occupational Skills, Knowledge & Conditions**			
Key Activity	**Performance Criteria**	**Occupational Skills & Knowledge**	**Conditions**		
8.2 Remedy equipment/process malfunction	8.2.1 Plan of action to remedy equipment malfunction or process abnormality is determined according to company procedures. 8.2.2 Plan of action to remedy equipment malfunction or process abnormality is implemented as per company procedures. 8.2.3 Equipment or process is verified to be within acceptable operational parameters according to company procedures.	Process Variables Operating Parameters System Components Heat and/or Material Balances SHE (Safety, Health, & Environment) Instrumentation and Control Systems Troubleshooting Process Symbols and/or Drawings Equipment Monitoring Personal Protective and/or Safety Equipment Operations	Drums Hoses Compressors Extruders Flares Boilers Cryogenic unit Economizer Switch gears Skimmers Steam traps Gloves Respirator Acid suit Ear muffs SCBA (Self-Contained Breathing Apparatus) Face shield Motor control centers Reverse osmosis unit Safety goggles/glasses Drum dolly Pumps (centrifugal, vacuum, positive displacement) Drivers (such as electrical motors, steam turbines, gas turbines, air drivers) Piping Scrubbers	Valves Filters Demisters Condenser Generators Transformers Aerators Clarifiers Fork lift Hand truck Slicker suit Hard hat Eyewash fountain FRCs (Flame Retardant Clothing) Thermal suit Furnaces/fired heaters Fire extinguisher Metatarsal guard Control valve (regulator) Instrumentation (analyzers, gauges, control loops, temperature sensing devices) Tools (such as sample thief, strapping tape, pipe wrench, channel locks, valve wrenches) Tubing Tanks Resins Cooling towers	Dryers Eductors Meters Incinerator Basins pH meters Superheaters Safety boots Ear plugs Safety shower First aid kit Fire monitors Tower (tray, packed) API separators/traps Microfiltration equipment Desuperheaters Heat exchangers (coolers, reboilers, fans) Heat recovery steam generator (waste heat boiler) Reactors (batch stirred tank or continuous stirred tank, fixed bed catalyst or fluidized bed catalyst) Fittings Safety harness Personal lift Computers UPS (uninterruptible power source)

CHEMICAL / REFINING PROCESS TECHNICIAN SKILL STANDARDS

Academic and Employability Knowledge and Skill Matrix for Critical Work Function 8: Troubleshoot Process Abnormalities and Equipment Malfunctions

On a scale of 1 (lowest) to 5 (highest), identify the level of complexity required in each of these skills for the worker to perform the critical work function. Keep in mind that this scale is not for rating an individual's proficiency. It is intended only for rating the level of complexity required to do the work.

Occupational Title: Chemical/Refining Process Technician																
CWF 8 Troubleshoot Process Abnormalities and Equipment Malfunctions																
Listening	Speaking	Using Information and Communication Technology	Gathering and analyzing Information	Analyzing and Solving Problems	Making Decisions and Judgments	Organizing and Planning	Using Social Skills	Adaptability	Working in Teams	Leading Others	Building Consensus	Self and Career Development	Writing	Reading	Mathematics	Science
4	3	2	4	4	3	2	3	4	3	2	2	2	3	4	3	3

Statement of Assessment for Critical Work Function 8

The statements of assessment can do any of several things:

- *Define tools or strategies that industry could use to assess the level of competency a worker has attained in a particular critical work function.*
- *Define for trainers and educators how to assess the level of competency a student has attained relevant to the critical work function.*
- *Define the level of mastery of the critical work function that indicates that a worker or student has achieved an entry-, intermediate-, or advanced level of mastery of a critical work function.*

A. Written tests could include:

(1) Multiple choice and essay questions that demonstrate an understanding of knowledge being assessed.

(2) Graphic representations (e.g. P&IDs and loop drawings) that reveal an understanding of symbology and connections between processes and devices.

(3) Preparation and justification of a reasonable solution to a problem scenario.

B. Hands-on exercises or simulations to demonstrate acquisition of knowledge, skills and attitudes that could:

(1) Represent a real life scenario, problem or challenging situation in the context of a work environment.

(2) Apply relevant knowledge or skills.

(3) Focus on the application of knowledge and skills to a new situation.

(4) Demonstrate an ability to plan, organize and create a product or an event.

(5) Illustrate by individual performance the attained levels of knowledge, skills and attitudes.

(6)Include observation of events, groups and individuals that focuses on the relevant traits of the skill or attitude being observed.

Occupational Title: Chemical/Refining Process Technician Skill Standards					
Critical Work Function 9. Maintain Safe and Healthful Work Environment		**Occupational Skills, Knowledge & Conditions**			
Key Activity	**Performance Criteria**	**Occupational Skills & Knowledge**	**Conditions**		
9.1 Conduct Preventative SHE Inspections	9.1.1 Area inspections are conducted according to established procedures. 9.1.2 Area inspection documentation is complete per company standards. 9.1.3 Inspection and audit findings are posted appropriately so that they are accessible to all relevant parties. 9.1.4 Inspection findings are remedied according to company policies and procedures	Process Variables Operating Parameters System Components SHE (Safety, Health, & Environment) Process Symbols and/or Drawings Hazard Labeling Equipment Monitoring Personal Protective and/or Safety Equipment Operations	Drums Hoses Compressors Extruders Flares Boilers Cryogenic unit Economizer Switch gears Skimmers Steam traps Gloves Respirator Acid suit Ear muffs SCBA (Self-Contained Breathing Apparatus) Face shield Motor control centers Reverse osmosis unit Safety goggles/glasses Drum dolly Pumps (centrifugal, vacuum, positive displacement) Drivers (such as electrical motors, steam turbines, gas turbines, air drivers) Piping Scrubbers	Valves Filters Demisters Condenser Generators Transformers Aerators Clarifiers Fork lift Hand truck Slicker suit Hard hat Eyewash fountain FRCs (Flame Retardant Clothing) Thermal suit Furnaces/fired heaters Fire extinguisher Metatarsal guard Control valve (regulator) Instrumentation (analyzers, gauges, control loops, temperature sensing devices) Tools (such as sample thief, strapping tape, pipe wrench, channel locks, valve wrenches) Tubing Tanks Resins Cooling towers	Dryers Eductors Meters Incinerator Basins pH meters Superheaters Safety boots Ear plugs Safety shower First aid kit Fire monitors Tower (tray, packed) API separators/traps Microfiltration equipment Desuperheaters Heat exchangers (coolers, reboilers, fans) Heat recovery steam generator (waste heat boiler) Reactors (batch stirred tank or continuous stirred tank, fixed bed catalyst or fluidized bed catalyst) Fittings Safety harness Personal lift Computers UPS (uninterruptible power source)

Occupational Title: Chemical/Refining Process Technician Skill Standards					
Critical Work Function 9. Maintain Safe and Healthful Work Environment		**Occupational Skills, Knowledge & Conditions**			
Key Activity	**Performance Criteria**	**Occupational Skills & Knowledge**	**Conditions**		
9.2 Conduct SHE incident and hazard investigations	9.2.1 Investigations of incidents and hazards are conducted according to established procedures. 9.2.2 Incident and investigation documentation is complete per company standards. 9.2.3 Incident and investigation reports and findings are disseminated to designated recipients according to company procedures. 9.2.4 Corrective action is taken as specified by company policies and procedures.	Process Variables Operating Parameters System Components SHE (Safety, Health, & Environment) Troubleshooting Process Symbols and/or Drawings Personal Protective and/or Safety Equipment Operations	Drums Hoses Compressors Extruders Flares Boilers Cryogenic unit Economizer Switch gears Skimmers Steam traps Gloves Respirator Acid suit Ear muffs SCBA (Self-Contained Breathing Apparatus) Face shield Motor control centers Reverse osmosis unit Safety goggles/glasses Drum dolly Pumps (centrifugal, vacuum, positive displacement) Drivers (such as electrical motors, steam turbines, gas turbines, air drivers) Piping Scrubbers	Valves Filters Demisters Condenser Generators Transformers Aerators Clarifiers Fork lift Hand truck Slicker suit Hard hat Eyewash fountain FRCs (Flame Retardant Clothing) Thermal suit Furnaces/fired heaters Fire extinguisher Metatarsal guard Control valve (regulator) Instrumentation (analyzers, gauges, control loops, temperature sensing devices) Tools (such as sample thief, strapping tape, pipe wrench, channel locks, valve wrenches) Tubing Tanks Resins Cooling towers	Dryers Eductors Meters Incinerator Basins pH meters Superheaters Safety boots Ear plugs Safety shower First aid kit Fire monitors Tower (tray, packed) API separators/traps Microfiltration equipment Desuperheaters Heat exchangers (coolers, reboilers, fans) Heat recovery steam generator (waste heat boiler) Reactors (batch stirred tank or continuous stirred tank, fixed bed catalyst or fluidized bed catalyst) Fittings Safety harness Personal lift Computers UPS (uninterruptible power source)

Occupational Title: Chemical/Refining Process Technician Skill Standards					
Critical Work Function 9. Maintain Safe and Healthful Work Environment		**Occupational Skills, Knowledge & Conditions**			
Key Activity	**Performance Criteria**	**Occupational Skills & Knowledge**	**Conditions**		
9.3 Instruct individuals entering operating area in SHE policies and procedures	9.3.1 Area specific safety orientation is provided for employees and contractors entering process unit. 9.3.2 All employees have current and continuing training on the SHE policies and procedures.	SHE (Safety, Health, & Environment Hazard Labeling Equipment Monitoring Personal Protective and/or Safety Equipment Operations	Drums Hoses Compressors Extruders Flares Boilers Cryogenic unit Economizer Switch gears Skimmers Steam traps Gloves Respirator Acid suit Ear muffs SCBA (Self-Contained Breathing Apparatus) Face shield Motor control centers Reverse osmosis unit Safety goggles/glasses Drum dolly Pumps (centrifugal, vacuum, positive displacement) Drivers (such as electrical motors, steam turbines, gas turbines, air drivers) Piping Scrubbers	Valves Filters Demisters Condenser Generators Transformers Aerators Clarifiers Fork lift Hand truck Slicker suit Hard hat Eyewash fountain FRCs (Flame Retardant Clothing) Thermal suit Furnaces/fired heaters Fire extinguisher Metatarsal guard Control valve (regulator) Instrumentation (analyzers, gauges, control loops, temperature sensing devices) Tools (such as sample thief, strapping tape, pipe wrench, channel locks, valve wrenches) Tubing Tanks Resins Cooling towers	Dryers Eductors Meters Incinerator Basins pH meters Superheaters Safety boots Ear plugs Safety shower First aid kit Fire monitors Tower (tray, packed) API separators/traps Microfiltration equipment Desuperheaters Heat exchangers (coolers, reboilers, fans) Heat recovery steam generator (waste heat boiler) Reactors (batch stirred tank or continuous stirred tank, fixed bed catalyst or fluidized bed catalyst) Fittings Safety harness Personal lift Computers UPS (uninterruptible power source)

Occupational Title: Chemical/Refining Process Technician Skill Standards					
Critical Work Function 9. Maintain Safe and Healthful Work Environment		**Occupational Skills, Knowledge & Conditions**			
Key Activity	**Performance Criteria**	**Occupational Skills & Knowledge**	**Conditions**		
9.4 Comply with company policies and procedures	9.4.1 Employees comply with company safety and environmental policies and procedures. 9.4.2 Safety and environmental compliance documentation is complete per company standards. 9.4.3 Safety and environmental improvements are submitted per company policies and procedures.	SHE (Safety, Health, & Environment) Hazard Labeling Personal Protective and/or Safety Equipment Operations	Drums Hoses Compressors Extruders Flares Boilers Cryogenic unit Economizer Switch gears Skimmers Steam traps Gloves Respirator Acid suit Ear muffs SCBA (Self-Contained Breathing Apparatus) Face shield Motor control centers Reverse osmosis unit Safety goggles/glasses Drum dolly Pumps (centrifugal, vacuum, positive displacement) Drivers (such as electrical motors, steam turbines, gas turbines, air drivers) Piping Scrubbers	Valves Filters Demisters Condenser Generators Transformers Aerators Clarifiers Fork lift Hand truck Slicker suit Hard hat Eyewash fountain FRCs (Flame Retardant Clothing) Thermal suit Furnaces/fired heaters Fire extinguisher Metatarsal guard Control valve (regulator) Instrumentation (analyzers, gauges, control loops, temperature sensing devices) Tools (such as sample thief, strapping tape, pipe wrench, channel locks, valve wrenches) Tubing Tanks Resins Cooling towers	Dryers Eductors Meters Incinerator Basins pH meters Superheaters Safety boots Ear plugs Safety shower First aid kit Fire monitors Tower (tray, packed) API separators/traps Microfiltration equipment Desuperheaters Heat exchangers (coolers, reboilers, fans) Heat recovery steam generator (waste heat boiler) Reactors (batch stirred tank or continuous stirred tank, fixed bed catalyst or fluidized bed catalyst) Fittings Safety harness Personal lift Computers UPS (uninterruptible power source)

Occupational Title: Chemical/Refining Process Technician Skill Standards					
Critical Work Function 9. Maintain Safe and Healthful Work Environment		**Occupational Skills, Knowledge & Conditions**			
Key Activity	**Performance Criteria**	**Occupational Skills & Knowledge**	**Conditions**		
9.5 Comply with local, state and federal policies and procedures	9.5.1 Employees comply with local, state and federal policies and procedures. 9.5.2 Safety and environmental compliance documentation is complete per local, state and federal standards	SHE (Safety, Health, & Environment Hazard Labeling Equipment Monitoring Personal Protective and/or Safety Equipment Operations	Drums Hoses Compressors Extruders Flares Boilers Cryogenic unit Economizer Switch gears Skimmers Steam traps Gloves Respirator Acid suit Ear muffs SCBA (Self-Contained Breathing Apparatus) Face shield Motor control centers Reverse osmosis unit Safety goggles/glasses Drum dolly Pumps (centrifugal, vacuum, positive displacement) Drivers (such as electrical motors, steam turbines, gas turbines, air drivers) Piping Scrubbers	Valves Filters Demisters Condenser Generators Transformers Aerators Clarifiers Fork lift Hand truck Slicker suit Hard hat Eyewash fountain FRCs (Flame Retardant Clothing) Thermal suit Furnaces/fired heaters Fire extinguisher Metatarsal guard Control valve (regulator) Instrumentation (analyzers, gauges, control loops, temperature sensing devices) Tools (such as sample thief, strapping tape, pipe wrench, channel locks, valve wrenches) Tubing Tanks Resins Cooling towers	Dryers Eductors Meters Incinerator Basins pH meters Superheaters Safety boots Ear plugs Safety shower First aid kit Fire monitors Tower (tray, packed) API separators/traps Microfiltration equipment Desuperheaters Heat exchangers (coolers, reboilers, fans) Heat recovery steam generator (waste heat boiler) Reactors (batch stirred tank or continuous stirred tank, fixed bed catalyst or fluidized bed catalyst) Fittings Safety harness Personal lift Computers UPS (uninterruptible power source)

CHEMICAL / REFINING PROCESS TECHNICIAN SKILL STANDARDS

Academic and Employability Knowledge and Skill Matrix for Critical Work Function 9: Maintain Safe and Healthful Work Environment

On a scale of 1 (lowest) to 5 (highest), identify the level of complexity required in each of these skills for the worker to perform the critical work function. Keep in mind that this scale is not for rating an individual's proficiency. It is intended only for rating the level of complexity required to do the work.

Occupational Title:																
CWF 9 Maintain Safe and Healthful Work Environment																
Listening	Speaking	Using Information and Communication Technology	Gathering and analyzing Information	Analyzing and Solving Problems	Making Decisions and Judgments	Organizing and Planning	Using Social Skills	Adaptability	Working in Teams	Leading Others	Building Consensus	Self and Career Development	Writing	Reading	Mathematics	Science
3	3	2	2	4	3	2	4	3	3	3	3	2	3	4	2	2

Statement of Assessment for Critical Work Function 9

The statements of assessment can do any of several things:

- *Define tools or strategies that industry could use to assess the level of competency a worker has attained in a particular critical work function.*
- *Define for trainers and educators how to assess the level of competency a student has attained relevant to the critical work function.*
- *Define the level of mastery of the critical work function that indicates that a worker or student has achieved an entry-, intermediate-, or advanced level of mastery of a critical work function.*

Tools & Strategy: The assessment process should include one or more of the following:

A. Written tests could include:

(1) Multiple choice and essay questions that demonstrate an understanding of knowledge being assessed.
(2) Graphic representations (e.g. P&IDs and loop drawings) that reveal an understanding of symbology and connections between processes and devices.
(3) Preparation and justification of a reasonable solution to a problem scenario.

B. Hands-on exercises or simulations to demonstrate acquisition of knowledge, skills and attitudes that could:

(1) Represent a real life scenario, problem or challenging situation in the context of a work environment.
(2) Apply relevant knowledge or skills.
(3) Focus on the application of knowledge and skills to a new situation.
(4) Demonstrate an ability to plan, organize and create a product or an event.
(5) Illustrate by individual performance the attained levels of knowledge, skills and attitudes.
(6)Include observation of events, groups and individuals that focuses on the relevant traits of the skill or attitude being observed.