































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

## 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		
2.2 Monitor and regulate boiler system	2.2.1 Heat transfer rates meet desired temperature per process/equipment specifications.	Process Variables	Drums	Valves	Dryers
	2.2.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities and other resources.	Operating Parameters	Hoses	Filters	Eductors
			Compressors	Demisters	Meters
	2.2.3 Product/process meets established process specifications.	Heat and/or Material Balances	Extruders	Condenser	Incinerator
			Flares	Generators	Basins
	2.2.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations.	SHE (Safety, Health, & Environment)	Boilers	Transformers	pH meters
			Cryogenic unit	Aerators	Superheaters
	2.2.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction.	Instrumentation and Control Systems	Economizer	Clarifiers	Safety boots
Switch gears			Fork lift	Ear plugs	
2.2.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy.	Fired Heaters/Furnaces	Skimmers	Hand truck	Safety shower	
		Steam traps	Slicker suit	First aid kit	
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.	Boilers	Gloves	Hard hat	Fire monitors	
		Respirator	Eyewash fountain	Tower (tray, packed)	
2.2.8 Process variables meet product and equipment parameters.	Steam Generation	Acid suit	FRCs (Flame Retardant Clothing)	API	
		Ear muffs	Thermal suit	separators/traps	
2.2.9 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction.	Personal Protective and/or Safety Equipment Operations	SCBA (Self-Contained Breathing Apparatus)	Furnaces/fired heaters	Microfiltration equipment	
		Face shield	Fire extinguisher	Desuperheaters	
2.2.10 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy.	Boiler Feed Water	Motor control centers	Metatarsal guard	Heat exchangers (coolers, reboilers, fans)	
		Reverse osmosis unit	Control valve (regulator)	Heat recovery steam generator (waste heat boiler)	
2.2.11 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy.	Steam Condensate	Safety goggles/glasses	Instrumentation (analyzers, gauges, control loops, temperature sensing devices)	Reactors (batch stirred tank or continuous stirred tank, fixed bed catalyst or fluidized bed catalyst)	
		Drum dolly	Tools (such as sample thief, strapping tape, pipe wrench, channel locks, valve wrenches)	Fittings	
2.2.12 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy.	Natural Gas	Pumps (centrifugal, vacuum, positive displacement)	Tubing	Safety harness	
		Drivers (such as electrical motors, steam turbines, gas turbines, air drivers)	Tanks	Personal lift	
2.2.13 Equipment is returned to service following mechanical work including verifying work, completing Lockout/Tagout, completing paperwork and start-up according to company policy.	Fuel Gas	Reverse osmosis unit	Resins	Computers	
		Safety goggles/glasses	Cooling towers	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	<p>2.3.1 Cooling rates meet desired temperature per process/equipment specifications.</p> <p>2.3.2 Production costs which are controlled by operators indicate efficient use of equipment, raw materials, utilities and other resources.</p> <p>2.3.3 Product/process meets established process specifications.</p> <p>2.3.4 Equipment is monitored and maintained according to manufacturer/company operational parameters, safety standards and government regulations.</p> <p>2.3.5 Equipment maintenance is coordinated according to mechanical requirements, maintenance schedule or equipment malfunction.</p> <p>2.3.6 Equipment is prepared for mechanical work including shut down and Lockout/Tagout according to company policy.</p> <p>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.</p> <p>2.3.8 Process variables meet product and equipment parameters.</p>	<p>Process Variables</p> <p>Operating Parameters</p> <p>System Components</p> <p>Heat and/or Material Balances</p> <p>SHE (Safety, Health, &amp; Environment)</p> <p>Instrumentation and Control Systems</p> <p>Troubleshooting</p> <p>Cooling Water</p> <p>Heat Exchangers</p> <p>Material Sampling</p> <p>Equipment Monitoring</p> <p>Personal Protective and/or Safety Equipment Operations</p>	<p>Drums</p> <p>Hoses</p> <p>Compressors</p> <p>Extruders</p> <p>Flares</p> <p>Boilers</p> <p>Cryogenic unit</p> <p>Economizer</p> <p>Switch gears</p> <p>Skimmers</p> <p>Steam traps</p> <p>Gloves</p> <p>Respirator</p> <p>Acid suit</p> <p>Ear muffs</p> <p>SCBA (Self-Contained Breathing Apparatus)</p> <p>Face shield</p> <p>Motor control centers</p> <p>Reverse osmosis unit</p> <p>Safety goggles/glasses</p> <p>Drum dolly</p> <p>Pumps (centrifugal, vacuum, positive displacement)</p> <p>Drivers (such as electrical motors, steam turbines, gas turbines, air drivers)</p> <p>Piping</p> <p>Scrubbers</p>	<p>Valves</p> <p>Filters</p> <p>Demisters</p> <p>Condenser</p> <p>Generators</p> <p>Transformers</p> <p>Aerators</p> <p>Clarifiers</p> <p>Fork lift</p> <p>Hand truck</p> <p>Slicker suit</p> <p>Hard hat</p> <p>Eyewash fountain</p> <p>FRCs (Flame Retardant Clothing)</p> <p>Thermal suit</p> <p>Furnaces/fired heaters</p> <p>Fire extinguisher</p> <p>Metatarsal guard</p> <p>Control valve (regulator)</p> <p>Instrumentation (analyzers, gauges, control loops, temperature sensing devices)</p> <p>Tools (such as sample thief, strapping tape, pipe wrench, channel locks, valve wrenches)</p> <p>Tubing</p> <p>Tanks</p> <p>Resins</p> <p>Cooling towers</p>	<p>Dryers</p> <p>Eductors</p> <p>Meters</p> <p>Incinerator</p> <p>Basins</p> <p>pH meters</p> <p>Superheaters</p> <p>Safety boots</p> <p>Ear plugs</p> <p>Safety shower</p> <p>First aid kit</p> <p>Fire monitors</p> <p>Tower (tray, packed)</p> <p>API separators/traps</p> <p>Microfiltration equipment</p> <p>Desuperheaters</p> <p>Heat exchangers (coolers, reboilers, fans)</p> <p>Heat recovery steam generator (waste heat boiler)</p> <p>Reactors (batch stirred tank or continuous stirred tank, fixed bed catalyst or fluidized bed catalyst)</p> <p>Fittings</p> <p>Safety harness</p> <p>Personal lift</p> <p>Computers</p> <p>UPS (uninterruptible power source)</p>

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

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

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

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

## 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.

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



## 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 Educators 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 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.

## CHEMICAL / REFINING PROCESS TECHNICIAN SKILL STANDARDS

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)

## CHEMICAL / REFINING PROCESS TECHNICIAN SKILL STANDARDS

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)

## CHEMICAL / REFINING PROCESS TECHNICIAN SKILL STANDARDS

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)

## CHEMICAL / REFINING PROCESS TECHNICIAN SKILL STANDARDS

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

## 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.

## CHEMICAL / REFINING PROCESS TECHNICIAN SKILL STANDARDS

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



## CHEMICAL / REFINING PROCESS TECHNICIAN SKILL STANDARDS

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

## CHEMICAL / REFINING PROCESS TECHNICIAN SKILL STANDARDS

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

## CHEMICAL / REFINING PROCESS TECHNICIAN SKILL STANDARDS

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)

## CHEMICAL / REFINING PROCESS TECHNICIAN SKILL STANDARDS

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)

## CHEMICAL / REFINING PROCESS TECHNICIAN SKILL STANDARDS

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)

## CHEMICAL / REFINING PROCESS TECHNICIAN SKILL STANDARDS

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)

## CHEMICAL / REFINING PROCESS TECHNICIAN SKILL STANDARDS

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)

## CHEMICAL / REFINING PROCESS TECHNICIAN SKILL STANDARDS

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



## CHEMICAL / REFINING PROCESS TECHNICIAN SKILL STANDARDS

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)

## CHEMICAL / REFINING PROCESS TECHNICIAN SKILL STANDARDS

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

## 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.

<b>Occupational Title: Chemical/Refining Process Technician</b>																
<b>CFW 6 Control Utility Systems</b>																
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.

## CHEMICAL / REFINING PROCESS TECHNICIAN SKILL STANDARDS

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)

## CHEMICAL / REFINING PROCESS TECHNICIAN SKILL STANDARDS

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)

## CHEMICAL / REFINING PROCESS TECHNICIAN SKILL STANDARDS

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

## 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.

## CHEMICAL / REFINING PROCESS TECHNICIAN SKILL STANDARDS

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)



## CHEMICAL / REFINING PROCESS TECHNICIAN SKILL STANDARDS

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

## 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.

## CHEMICAL / REFINING PROCESS TECHNICIAN SKILL STANDARDS

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)

## CHEMICAL / REFINING PROCESS TECHNICIAN SKILL STANDARDS

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

## CHEMICAL / REFINING PROCESS TECHNICIAN SKILL STANDARDS

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

## CHEMICAL / REFINING PROCESS TECHNICIAN SKILL STANDARDS

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

## CHEMICAL / REFINING PROCESS TECHNICIAN SKILL STANDARDS

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.