



MN-PV-CIS-091

Steamer Competency Manual

MN-PV-CIS-091 – Steamer Competency Manual
Rev 4

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Training Expectation Letter

It is required that this document is completed prior to the Employee starting training on a P&V Steamer Truck. This document will serve as formal record that all parties have reviewed and understand the expectations for training on the Steamer Truck.

Trainee Name:

Date of Discussion:

Expectations of Supervisor/Leader

- Ensuring trainee has scheduled time for training.
- Ensure trainee has reviewed and understand the technical documentation
- Ensure trainee has been provided a demonstration on equipment operation
- Verify field competency sign offs once completed
- Ensure trainee is working with a competent mentor until they are competent themselves
- Provide support for the assessor, mentor, trainer and trainee whenever possible.
- Ensure training documentation is sent to CEDA Training Department

Expectations of Trainer, Mentor, assessor

- Must be qualified in the position for which he/she is training.
- Educate and support trainee with technical review package.
- Ensure trainee has been provided a demonstration on equipment operation
- Review trainee's technical knowledge and verify acceptable understanding
- Educate and support trainee with field tasks identified in the competency check sheet
- Verify trainee has the ability to perform tasks identified in the competency check sheet
- Communicate to Supervisor that the technical review and field competency is complete

Expectations of Trainee

- Complete all prerequisites outlined within the training program.
- Understand the training process outlined in this document.
- Understanding systems and spending time in the field.
- Ensure all lessons and tasks are signed off by the appropriate personnel as indicated on the training documents.
- Inform Supervisor/Leader on progress of training through face to face meetings.
- Will utilize all the materials provided to ensure a comprehensive training program is followed.
- Provide feedback on the training process and any updates that are required to the training material.
- Inform Supervisor/Leader of any training barriers that may exist during the training process.

Training Expectation Acceptance Agreement

I, _____ understand the expectations of me as a trainee as outlined in this document

(Operator Name)

Operator\Trainee

Name

Signature

Date (MM\DD\YY)

Supervisor/Leader

Name

Signature

Date (MM\DD\YY)



Acknowledgement

This manual has been developed using information and knowledge obtained from manufacturer's documentation and input from experienced Operators. Additionally, this manual has been validated by numerous Subject Matter Experts at CEDA. We welcome any comments or suggestions pertaining to this manual and its contents.

Many thanks to those who have demonstrated a clear dedication to CEDA and our values by participating in the creation of this program.

Michael Humen (Edmonton, AB)

Steve Johnson (Edmonton, AB)

Richard Day (Fort McMurray, AB)

Chris Duke (Regina, SK)

Mike McHugh (Saint John, NB)

Gary White (Fort McMurray, AB)

Joe Ouellette (Fort McMurray, AB)

Jamie Goudreau (Fort McMurray, AB)

Jim Lanigan (Edmonton, AB)

Leonard Skinner (Edmonton, AB)

Tony Smith (Edmonton, AB)

Thera Demers-Ortiz (Edmonton, AB)





Objective

Welcome to CEDA Steamer Training

This program is designed to provide you with the training necessary to carry out your job in a manner that safeguards yourself, those around you and our environment. Upon Completion of this Module you will be able to:

- Identify Equipment and Components
- Describe the Operation
- Identify Safety considerations when using the steamer

Employee(s) will demonstrate knowledge & skill in the proper application of equipment through practical application.

Instructions

All material must be completed in the order presented to ensure that prerequisites are met.

Employees will demonstrate knowledge and skill in the proper application of equipment through practical demonstration and application.

NOTE: All forms and procedures included are those required by CEDA. Work must be performed in accordance with these standards. On Client work sites, there may be additional standards and modified work procedures that will also have to be met.

Description: This is a knowledge and practical skill that requires written material to be reviewed along with the completion of an on-the-job demonstration prior to the test being written.

Whenever possible, the on-the-job demonstration should be completed at a job site or the shop under controlled conditions.

Arrange a time with your Mentor/Supervisor/Trainer to complete the On-the-Job Demonstration, where you will observe the proper operation of the Steamer unit and its components.

Assessment of Competency: Successful completion of this competency requires:

- A score of 100% on the written examination.
- A successful demonstration by trainee requiring a sign-off from Trainer.



Prerequisites

- CEDA Orientation
- CEDA Introduction to High Pressure Water Blasting
- Specific work location Orientation

Below is a list of the learning resources that are included and others you must obtain the most recent version from your Supervisor.

- Water Blasting Procedure
- Operate Snap Gun Procedures
- Cleaning Equipment with Steamer Safe Work Procedure
- CEDA Pre-Trip Inspection (Vehicle Inspection Report)
- Site specific documentation
- Job Hazard Analysis for the work
- CEDA FLHA
- Other CEDA procedures and practices that pertain to the job being completed

NOTE: All forms and procedures included are those required by CEDA. Work must be performed in accordance with these standards and can be found in CEDA Health, Safety and Environment Management System (HSEMS) or be requested from your Leader. On Client work sites, there may be additional standards and modified work procedures that will also have to be met.

General Overview

Federal & Provincial Legislation

All work must be completed in accordance with applicable Municipal, Provincial, & Federal Acts & Regulations, including but not limited to:

Transportation of Dangerous Goods (TDG)

- Vehicle must be DOT Approved and be equipped with appropriate safety devices
- DOT approved vehicles will have sticker on side of unit
- Operator must place appropriate placards on side of vehicle
- Operator must prepare bill of lading prior to transporting materials

The Workplaces Hazardous Materials Information System (WHMIS)

- All CEDA field employees working with or around equipment will have WHMIS and TDG training prior to starting work.

Occupational Health & Safety (OH&S)

Seat Belts

Anytime a vehicle (CEDA owned or personal) is being operated during business hours for business use, or on CEDA property, the occupants must be wearing seatbelts.



Personal Protective Equipment (PPE)

To operate the Steamer unit, employees must have and utilize the following personal protective equipment (PPE):

- CSA Certified Hard Hat
- CSA Certified Safety Boots (Boot Grips when required)
- Fire Retardant Coveralls
- Hearing Protection (plugs or muffs)
- Approved Gloves for the Site/Task
- Safety Glasses with Side Shields.
- Rain Gear as Required

When using a snap gun and cleaning with high pressure water & chemical cleaning snap gun, all PPE including the list below must be worn:



- Face shield
- Full rain suit
- Rubber gloves
- Approved rubber boots

For hot materials, the following additional personal protective equipment may also be required:

- Rubber gloves
- Steel-toed rubber boots
- Face shield

Workplace Organization

CEDA's goal is to reduce waste (time, energy and materials) by maintaining an orderly and clean workplace, including our trucks and equipment. We ask that you take pride in the equipment you operate; treat it as if it were your own. A clean and organized vehicle/workspace is a safer vehicle/workspace. There are many ways to eliminate waste:

Allocation & Utilization of Resources: Have the right people and equipment in the right place, at the right time. Use equipment and resources on tasks and activities that are required and add value to our business.

Improve Productivity: Eliminate redundant or unnecessary steps/tasks without negative impact to the safety or quality of our products and services.

Use of Materials: Ensure equipment is stocked with required supplies (filter bags, duct tape etc.) before leaving for jobsite – replace the materials you have used during the shift to ensure that the next crew is adequately stocked. Use the correct materials in the quantities required to do the job safely & correctly.

Preventative Maintenance: Tools and equipment should be assessed as per the performance maintenance schedule to ensure safe operation. Regular maintenance will reduce costly breakdowns in the field.

There are steps we can take to improve our current state and move towards a more productive, organized and safe work environment. Improving workplace organization will reduce costs, improve morale and create a safer work environment. The following steps outline how best to achieve an organized workplace:

Sort, organize and eliminate unnecessary items from the workplace to eliminate clutter. Keep only essential items.

- Tools and equipment that are not utilized for day-to-day operations should be repurposed within the organization or discarded.
- Garbage or loose items should be removed or properly stored.

Prioritize tools, parts and materials based on usage and keep them in easily-accessible places.

- A place for everything and everything in its place.



Create storage areas that are easy to access and clearly laid out:

- Tools and equipment should be stored clean and ready for use.
- Storage areas and stored items should be properly identified using signage, labels or a visual outline.

Set clear standards for workplace organization:

- Hold yourself and others accountable for keeping the work areas clean and safe. Make workplace organization a standard work rule in your area.
- Clean general work areas and equipment after each shift.
- Put clean tools away in the proper place.
- Note any spills, leaks or other messes – clean and report if equipment requires maintenance
- Inspect the area(s) regularly and immediately record and correct any infractions. Handle deviations from work rules in a timely manner.
- Review processes and procedures regularly and adjust as required.

Equipment Overview

Steamer

The Steamer is a wet or dry, low volume, low pressure cleaning unit used by CEDA. The steamer utilizes a wash gun for high pressure washing and a steam lance for wet and dry steaming. Its main application is thawing and cleaning valves, gears, pillars, machinery and equipment. The steamer is also used for 'snaking' frozen lines in the winter season. When 'snaking' out a line the pressure is not to exceed 1,000 psi.

The steaming operation is performed by two personnel; an operator and a laborer. The operator is responsible for operating the steamer and constantly monitoring the pressure and temperature gauges, while the laborer performs the actual cleaning, steaming operation. A third person is not required for the steaming operation if the pressure is held below 1,000 psi.

AN OPERATOR MUST BE PRESENT AT ALL TIMES WHILE THE BURNER IS ACTIVATED.

Steam Cleaning Process

Steam cleaning is accomplished by pumping water from the water tanks and filtering it through the water filter. The water is then taken to the pump and through the boiler as follows:

Water Tanks → Water Filter → Pump → Boiler → Hose Valves → Wash Gun

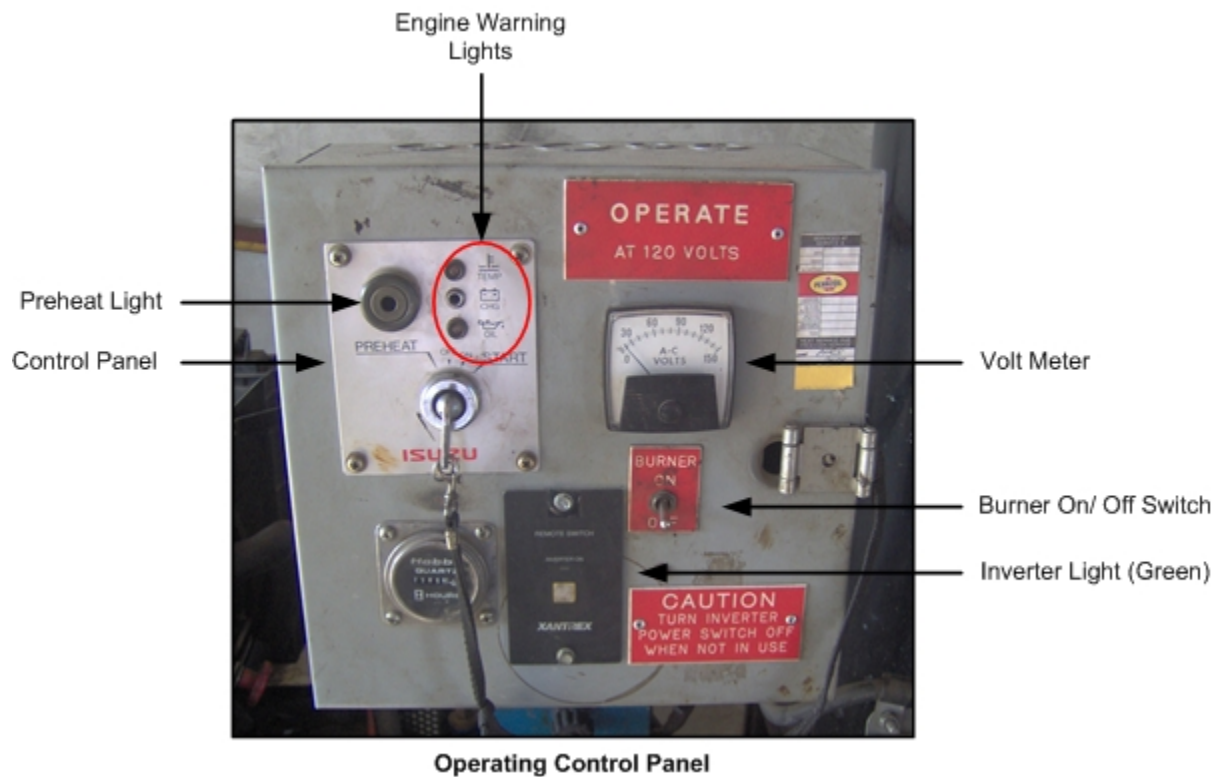
HIGH PRESSURE WATER CAN CAUSE SEVERE BODILY INJURY

Steamer Components

The Steamer has many components that are discussed below.

Control Panels

There are two control panels located on the steamer; Operating Control Panel and Temperature Control Panel. The **Operating Control Panel** contains:



- **Burner On/ Off Switch**
The burner On-Off Switch cannot be turned ON until the volt meter indicates 110V – 120V or the green inverter light illuminates and a flow of water exits the wash gun.
- **Volt Meter**
The volt meter indicates when the unit has reached the correct voltage to operate the boiler (not applicable to all units) but does not indicate if ignition has been made.
- **Control Panel (Preheat, On, Off, Start)**



The Preheat setting heats the glow plugs and allows the unit to warm up. Warm up should take place for 15 seconds. The motor must not be shut OFF until the thermostat indicates 100°F or less (thermostat located on Temperature Control Panel). This will help prevent hot water from backing into the high pressure pump

- **Green Inverter Light***

The inverter light will illuminate when burner or boiler is ready to start up.

* Not all units are equipped with this light. If a unit is not equipped with this light, use the voltage meter to determine if ignition has been made.

Located underneath the Operating Control Panel are the Control Valves. The following operations are controlled using this panel:

- Throttle
- Emergency Shutdown
- Dry and Wet Steam Operation
- Soap

To activate the throttle, pull out and turn to desired speed, usually when the green light illuminates on the inverter or when voltage meter indicates 110 – 120V.

To activate the Emergency Shutdown, pull out.

Use the wet and dry steam knob to use either wet steam or dry steam. Instructions are located directly above and below the knob (see picture below).

The soap knob controls the amount of soap being used.



Wet Steam Operation Instructions



Dry Steam Operation Instructions



-
- Thermostat
- Reset Indicator Light
- Temperature Control Panel**



When activated, it prevents the burner combustion chamber from loading up with fuel should ignition failure occur. It works in conjunction with a cadmium sulfide photo-cell. The photo-cell is located in the air chamber just below electrodes and fuel nozzles.

The steamer utilizes two types of hoses: a high pressure hose and steam hose. The hose reels house the high pressure hose which is strictly used for high pressure washing. The steam hose is used for both wet and dry steam. All hoses must be pressure and temperature rated. Always remember to install whip checks and quick connects on all hoses.



**High Pressure Hose
(on Hose Reels)**



Steam Hoses



Hose Valves

Both types of hoses are connected to the hose valves which are attached to the boiler. The high pressure hose is connected directly from the hose valve to the hose reels. The steam hose is also connected to the hose valve but may or may not be connected to the remaining steam hoses hanging on the wall. The two hose valves controlling the hoses are seen in the picture to the left. The red valve controls the steam hose and the orange valve controls the high pressure hose.

Note: The color of these valves may differ on every unit.

During set up, hook up the appropriate hose for the job and turn the valve to activate.



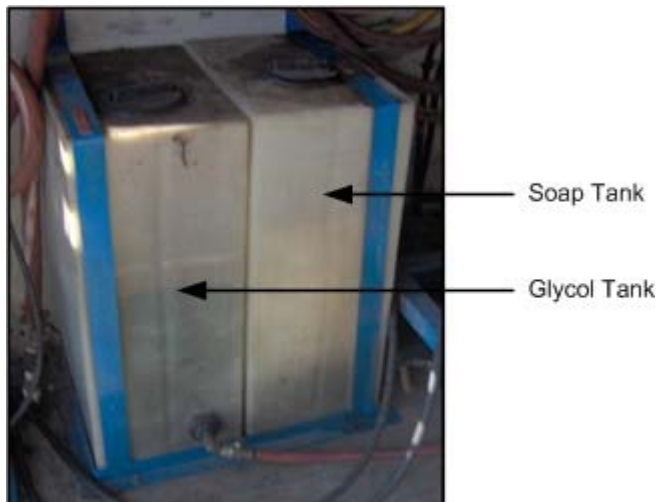
Soap and Glycol Tanks

The soap and glycol tanks are used for degreasing and the glycol is used for winterizing the unit.

Ensure the correct tank is chosen for the appropriate usage (e.g. glycol for winterizing, not soap).

The amount of soap is controlled by the soap valve on the control panel.

The glycol gets suctioned into the pump which then goes to the boiler and out the end of the hose reel. The glycol must be circulated until the water starts turning color. At this point, the glycol is pumped back into its compartment.



Soap & Glycol Tanks

Boiler

The boiler creates the steam and has two red panels and four pressure and temperature gauges.

When burner is on, water is heated as it flows through the coil, high pressure hose and wand.

When the preset water temperature is reached, the thermostat will interrupt the fuel supply to the fuel nozzles. The fuel solenoid will close. The air blower and motor will continue to operate and keep the combustion chamber purged. As the probe senses a drop in water temperature, the thermostat will activate the fuel valve. Burner ignition is automatic and the cycle will repeat. To increase or decrease water temperature, change dial setting.



Boiler



Pressure & Temperature Gauges

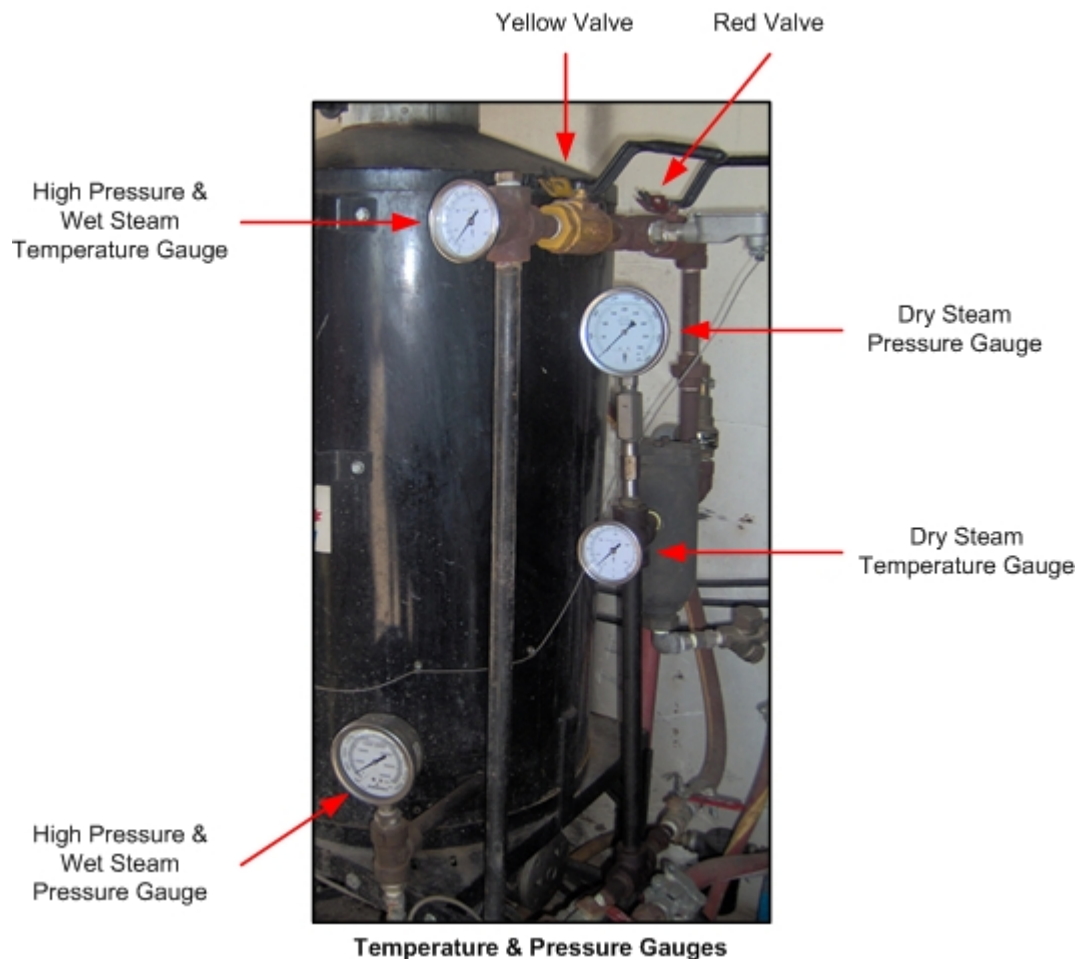


The heater will remain in operation, provided there is power, fuel and water flow.

Open the chimney vent prior to starting a job and ensure upon job completion the handle is lowered to close the vent during transit.

Pressure and Temperature Gauges

The boiler has temperature and pressure gauges and valves attached to the side (as identified below). Different gauges and valves are used to perform different operations. For high pressure operations, close the red valve and open the yellow. For wet steam operations, close the red valve and open the yellow valve. For dry steam operations, close the yellow valve and open the red valve.



Flow Switch

The flow switch is a safety device that prevents burner firing, when the water flow is interrupted. The switch body is installed in the fluid system, so that water must flow through it when the system is operating and the gun trigger is activated.

The water flow moves a magnet in the body of the flow switch. The magnet holds a reed switch closed when water is flowing through the system, this supplies electrical current to the burner system. When the water flow ceases, the magnet moves down the flow switch body causing the reed switch to open, shutting off the electrical current to the burner system. This will shut down the burner.

If the flow switch were to fail, the electrical current to the burner system might not shut off. This could result in a fire in the boiler as fuel would still be supplied to the burner, with no water flowing through the boiler tubes.

The flow switch should be replaced once a year. As the flow switch is a sealed unit, inspection in the field is not possible. The Steamer Operator must ensure that anytime the steamer pump is shut off or the gun valve is open that the burner is shut off. If the flow of fuel to the burner is not shut off, the operator must shutdown the burner and have the unit repaired by a certified mechanic.

Red Panels

The top panel indicates which valves to use for dry steam, wet steam and high pressure operations. The bottom panel indicates the temperature and pressure parameters of steam operation and high pressure operation. The operator must refer to these parameters when setting the control panel.

For example, if you exceed 90° at 3,000 psi steam you are exceeding the rating of the high pressure hose.



Boiler Instructions

Water Tanks

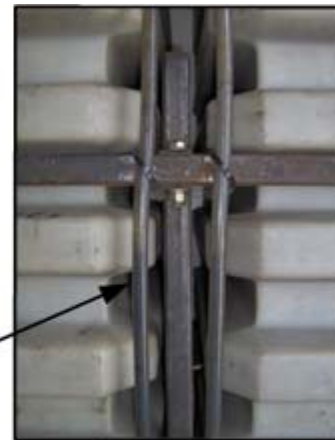
There are two water tanks located in the truck that supply water to the pump. Both tanks have water valves located at the bottom. At least one of these valves must be in the OPEN position in order to supply the pump with water.

Each tank also has a sight glass which indicates the water level in each tank. Always ensure a reasonable amount of water is in each tank.



Water Tanks

Sightglass



Water Level
Indicator

Sightglass Close-Up

Fuel Filter and Fuel Pressure Gauge

Fuel that is going to the boiler will pass through the fuel filter and a pressure reading will appear on the pressure gauge.

During operations, if the boiler will not light check the fuel pressure.



Fuel Filter & Fuel Pressure Gauge

Dry Steam Instruction Panel

This instruction panel is located on the wall behind all the temperature and pressure gauges. It should be referred to by the operator when operating with dry steam.

The instruction panel indicates which valves will direct hot condensate during dry steam operations.



Dry Steam Instruction Panel



Dry Steam Operation Panel - Hot Condensate

Pressure Relief Valve

The pressure relief valve relieves pressure if it gets too high. It will automatically open to prevent over pressuring of the boiler.



Pressure Relief Valve

Daily Pre-Job Checklist for Steamer

This checklist must be completed by the operator at the beginning of every shift and must be reviewed and signed by all personnel.

	FORM	Effective Date	Document ID
	STEAMER TRUCK DAILY PRE-JOB INSPECTION	NOVEMBER 2017	4-PRES-ALL-0081
	Template Approved By: Director, Industrial Cleaning Centre of Excellence	Page 1 of 2	Revision 2.0

JOB LOCATION: _____ UNIT: _____ DIVISION: _____ SKID: _____

OPERATOR: _____ / _____ DATE: _____
Name Signature (DD/MM/YY)

For more information, please refer to the Operation and Maintenance Manual or any other applicable manuals and instructions for this product. If you have questions, please contact your supervisor.

Item	Inspection Checklist	Yes	No	N/A
1.0	Fluid Levels			
1.1	Front and back engines	☐	☐	☐
1.2	High pressure pump	☐	☐	☐
1.3	Fuel	☐	☐	☐
2.0	High Pressure Pump			
2.1	Ensure drive belts are in good condition and tight	☐	☐	☐
2.2	Check packing and O rings for leaks	☐	☐	☐
2.3	Check all plumbing for leaks	☐	☐	☐
2.4	Ensure high pressure gauge is applicable for pump	☐	☐	☐
2.5	(50% greater than maximum pump pressure)	☐	☐	☐
2.6	Ensure needle valve is in good condition and sealed	☐	☐	☐
2.7	Is clutch greased and in good working condition	☐	☐	☐
2.8	Is the guard in place and secured.	☐	☐	☐
3.0	Equipment To Perform Task			
3.1	Job procedure	☐	☐	☐
3.2	Two (2) hoses on steamer	☐	☐	☐
3.3	All hoses are white high pressure hose.	☐	☐	☐
3.4	If yes, continue. If no, report to supervisor immediately	☐	☐	☐
3.5	Hoses	☐	☐	☐
3.6	Whip checks	☐	☐	☐
3.7	Steam gun	☐	☐	☐
3.8	Tips or nozzles	☐	☐	☐
3.9	Tip cleaner	☐	☐	☐

Item	Inspection Checklist	Yes	No	N/A
3.10	Rain gear	☐	☐	☐
3.11	Proper PPE	☐	☐	☐
3.12	Pipe wrenches	☐	☐	☐
3.13	Extra packing and O rings	☐	☐	☐
3.14	Grease gun and grease	☐	☐	☐
4.0	Cab			
4.1	No flammable/combustible allowed inside the cabin	☐	☐	☐
4.2	Ensure to remove trash and loose items	☐	☐	☐
4.3	Ensure to conduct proper housekeeping	☐	☐	☐
5.0	Miscellaneous			
5.1	Are all fittings, piping and hoses in good operating condition	☐	☐	☐
5.2	Has system been flushed before installing jets or nozzle	☐	☐	☐
5.3	Has water screen or filter been checked	☐	☐	☐
5.4	Are all gauges in good working order	☐	☐	☐
5.5	Is steam gun in working condition	☐	☐	☐
5.6	Ensure chemical tank is depressurized before refueling	☐	☐	☐
5.7	Function test Positive Air Shutoff (PAS) if equipped	☐	☐	☐
6.0	Post Trip			
6.1	Unit fueled up	☐	☐	☐
6.2	Unit ready for next job	☐	☐	☐
6.3	All extra PPE brought back	☐	☐	☐
6.4	Hoses properly secured for transport	☐	☐	☐

| Accountability | Communication | Integrity | Our People | Our Customer | Safety | Trust |

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By my signature below, I acknowledge that I have completed this document by verifying each item.

Crew Member(S):
 Print: _____ Sign: _____
 Print: _____ Sign: _____
 Print: _____ Sign: _____



Safety Considerations

Failure to read and observe all safety considerations statements could result in severe injury or death to personnel and damage to property.

- Never use a snap gun to clean off yourself or others. Severe injury can occur.
- Machines can cause an explosion when operated near flammable materials and vapors. Do not use this machine with or near fuels, grain, dust, solvents, thinners, or other flammable material. Do not operate this unit in an explosive or flammable environment.
- This machine emits carbon monoxide. Asphyxiation could occur if the unit is used in an area with poor or inadequate ventilation. Operate unit in a well-ventilated area.
- Operate a machine that is not completely or fully assembled could result in injury or property damage. Do not operate this machine until it is completely assembled. Inspect hoses, fittings, and boiler for leaks or fatigue before each use.
- Filling a machine with fuel in an explosive or poorly-ventilated area can cause an explosion. Only fill the fuel tanks in an open area. Care should be taken if fuel tank is located near the engine. Allow engine to cool before refueling depending on location of fuel tank.
- Do not smoke while filling the tank. Do not over fill the tank. Wipe up any spills. Tighten the cap on tank when finished.
- Tampering with the machine's factory reset unloader valve setting and/ or the pressure relief valve setting could result in a machine explosion. Do not attempt to change the settings. Discontinue use if a malfunction occurs and contact your Supervisor.
- Do not operate the unit with a malfunctioning burner or burner controls.
- Water under high pressure can cause severe injury.
- Injury to the operator or bystanders could occur if the machine is operated without all guards in place on the unit. When operating the machine, all guards must be in place.
- Machines have moving parts and hot areas that can cause injury. Keep hands, feet and loose clothing away from the unit while it is running.
- Always wear correct PPE when operating the unit.
- Shut the machine OFF before servicing. Failure to do so could result in injury.
- All personnel must be properly trained prior to operating this machine.
- Electrical damage can occur if the machine is exposed to direct and/ or over spray. Always point the wand toward the object being cleaned.
- Do not use this machine as a stepladder.
- Operating a pressure washer when the pump is low on oil could cause pump damage. Always check your oil before using the machine.
- Pump damage could result from operating the unit with insufficient water flow.
- Pump damage could occur if the pressure washer is ran for more than five minutes with the trigger released (closed).
- Run engine at full RPM when burner is on.
- When snaking, ensure all appropriate PPE is worn.
- Ensure unit is winterized in cold weather.
- Ensure boiler is cooled down sufficiently before shutting down engine.
- The snap gun must have a 48" barrel if pressure at the pump is above 1,000 psi.
- Always install whip checks and quick connects prior to operating.



Operational Guidelines

Operate High Pressure Steamer using Snap Gun Procedure

ACTION	NOTES
Pre-Start	
1. OBTAIN all work permits.	
2. REVIEW Tool Box Talk, Permit, Pre-Job Meeting, FLRA, etc.	
3. PERFORM Daily Pre-Job Checklist for Steamer.	
4. PARK unit in a well ventilated and convenient location.	
5. ENSURE all power switches in OFF position.	
6. OPEN water supply valves to the pump.	
7. OPEN roof hatch and lock in position.	
8. CLOSE red valve and OPEN yellow valve.	
9. SET thermostat at 90°C (195°F).	
Start-Up	
10. TURN starter key counter clockwise to preheat engine...	<i>... maximum 15 seconds. ... prior to starting engine.</i>
11. IDLE for warm up...	<i>... approximately two minutes. ... slow idle.</i>
12. HOOK UP high pressure hose to outlet of heater.	
13. ENGAGE pump to flush out hoses.	
14. FLUSH high pressure hose...	<i>... if there is any glycol in the hose, circulate it back to the glycol tank.</i>
15. DISENGAGE pump after flushing.	
16. SET UP snap gun to end of hose.	
17. RE-ENGAGE pump.	
18. OPEN trigger gun...	<i>... ensuring water flow exists before increasing rpm.</i>
19. INCREASE engine rpm...	<i>... volt meter must read 110 – 120 volts. ... turn to the left, then decrease and turn to the right. ... pressure gauge should read 2,000 psi.</i>
20. TURN ON burner.	



21. RE-ADJUST throttle to read 110 – 120 volts.	
Operation	
22. CHECK fuel pressure gauge...	<i>... should read minimum 100 psi (max 140 psi).</i>
23. CHECK temperature gauge...	<i>... should read 180 °F to 200 °F.</i>
If Using Soap: 24. MIX soap is chemical tank...	<i>... as required. ... open soap valve for soap, close for rinse.</i>
Shut Down	
25. TURN burner off...	<i>... before releasing engine throttle control.</i>
26. DECREASE engine speed...	<i>... to allow for cool down of heater and engine.</i>
27. DISENGAGE pump.	
28. CLOSE roof hatch and lock.	
29. CLOSE water supply valve to pump.	

EXERCISE CAUTION IF UNIT HAS BEEN WINTERIZED

Snake Out Lines Procedure

ACTION	NOTES
Snake Out Lines	
1. OBTAIN all work permits.	
2. REVIEW Tool Box Talk, Permit,	
3. PERFORM Daily Pre-Job Checklist for Steamer.	
4. PARK unit in a well ventilated and convenient location.	
5. RIG IN hoses, dump system and anti-withdrawal system...	<i>... if unit has been winterized drain the glycol back to the glycol tank.</i>
6. START UP engine...	<i>... let it warm up for a few minutes.</i>
7. OPEN water supply to pump.	
8. ENGAGE pump and FLUSH OUT hoses...	<i>... test dump.</i>
9. INSTALL anti-withdrawal system...	<i>... ensure system works.</i>
10. SHUT DOWN pump and INSTALL tip.	
11. ENGAGE pump, SET rpm and TURN ON boiler.	



12. SNAKE line...	<i>... when temperature reached.</i>
13. TURN OFF boiler...	<i>... allow water to cool.</i>
14. DECREASE engine speed...	<i>... to allow for cool down of heater and engine.</i>
15. DISENGAGE pump.	
16. CLOSE roof hatch and lock.	
17. CLOSE water supply valve to pump.	

EXERCISE CAUTION IF UNIT HAS BEEN WINTERIZED

Operate Steamer (Wet) Procedure

ACTION	NOTES
Pre-Start	
1. OBTAIN all work permits.	
2. REVIEW Tool Box Talk, Permit, Pre-Job Meeting, FLRA, etc.	
3. PERFORM Daily Pre-Job Checklist for Steamer.	
4. PARK unit in a well ventilated and convenient location.	
5. ENSURE all power switches in OFF position.	
6. OPEN water supply valves to the pump.	
7. OPEN roof hatch and lock in position.	
8. CLOSE red valve and open yellow valve.	
9. SET thermostat at 160°C (315°F).	
10. HOOK UP steam hose and snap gun or lance to outlet of heater.	
Start-Up	
11. ENGAGE pump.	
12. TURN starter key counter clockwise to preheat engine...	<i>... maximum 15 seconds. ... prior to starting engine.</i>
13. ENSURE steady water flow from steam hose...	<i>... before increasing engine rpm.</i>
14. INCREASE engine rpm...	<i>... volt meter must read 110 – 120 volts. ... to increase – turn to the left; to decrease – turn to the right.</i>
15. ADJUST steam valve...	<i>... by closing to read 250 psi to 300 psi on pressure gauge.</i>



16. TURN ON burner.	
17. RE-ADJUST throttle to read 110 – 120 volts...	<i>... voltage may drop when engine is at full load.</i>
Operation	
18. CHECK fuel pressure gauge...	<i>... should read minimum 100 psi (max 140 psi).</i>
19. CHECK temperature gauge...	<i>... should read 300 °F to 315 °F.</i>
If Using Soap:	
20. MIX soap is chemical tank...	<i>... as required. ... open soap valve for soap, close for rinse.</i>
Shut Down	
21. TURN burner off...	<i>... before releasing engine throttle control.</i>
22. DECREASE engine speed...	<i>... to allow for cool down of heater and engine.</i>
23. CLOSE red steam valve.	
24. CLOSE roof hatch and lock.	
25. CLOSE water supply valve to pump.	

EXERCISE CAUTION IF UNIT HAS BEEN WINTERIZED

Operate Steamer (Dry) Procedure

ACTION	NOTES
Pre-Start	
1. OBTAIN all work permits.	
2. REVIEW Tool Box Talk, Permit, Pre-Job Meeting, FLRA, etc.	
3. PERFORM Daily Pre-Job Checklist for Steamer.	
4. PARK unit in a well ventilated and convenient location.	
5. ENSURE all power switches in OFF position.	
6. OPEN water supply valves to the pump.	
7. OPEN roof hatch and lock in position.	
8. CLOSE yellow valve and OPEN red valve.	
9. SET thermostat at 170°C (325°F).	
10. HOOK UP ¾" steam hose and lance to outlet of heater.	
Start-Up	



11. ENGAGE pump.	
12. TURN starter key counter clockwise to preheat engine...	<i>... maximum 15 seconds. ... prior to starting engine.</i>
13. ENSURE steady water flow from steam hose...	<i>... before increasing engine rpm.</i>
14. OPEN steam valve 3 turns...	<i>... for dry steam operation.</i>
15. INCREASE engine rpm...	<i>... slowly. ... volt meter must read 110 – 120 volts. ... to increase – turn to the left; to decrease – turn to the right.</i>
16. TURN ON burner.	
17. RE-ADJUST throttle to read 110 – 120 volts...	<i>... voltage may drop when engine is at full load.</i>
Operation	
18. CHECK fuel pressure gauge...	<i>... should read minimum 100 psi (max 140 psi).</i>
19. CHECK temperature gauge...	<i>... should read 325 °F to 340 °F. ... some pulsation will occur in dry steam hose until temperature is achieved.</i>
20. CHECK dry steam pressure gauge...	<i>... should read 50 psi to 75 psi. ... safety valve set 150 psi.</i>
Shut Down	
21. TURN burner off...	<i>... before releasing engine throttle control.</i>
22. DECREASE engine speed...	<i>... to allow for cool down of heater and engine.</i>
23. CLOSE red steam valve.	
24. CLOSE roof hatch and lock.	
25. CLOSE water supply valve to pump.	

EXERCISE CAUTION IF UNIT HAS BEEN WINTERIZED

Winterization Steamer Procedure

ACTION	NOTES
Winterize	
1. CLOSE all water supply valves.	
2. DRAIN all water lines and hoses.	
3. OPEN valve on glycol tank.	
4. START UP engine.	
5. REMOVE snap gun from end of hose.	



6. ENGAGE pump.	
7. PUMP water out of system.	
8. WATCH at hose end...	<i>... when color changes put hose in top of glycol tank.</i>
9. DISENGAGE pump.	
10. SHUT DOWN engine.	
11. DRAIN water tanks at correct location...	<i>... shop, wash pad.</i>

Maintenance

Maintenance must occur on a regular basis to keep the equipment in working order. Follow the chart below for regular maintenance activities.

COMPONENT	MAINTENANCE ACTIVITY
Before Each Use	
Burner and Burner Controls	Inspect operation. Failure to inspect regularly may result in an explosion.
Hoses and Fittings	Inspect for worn or frayed ends.
Snap Gun	Inspect for damage.
Dump System	Inspect for damage.
40 Hours of Use or Once a Month (whichever is first)	
High Pressure Pump Crankcase	Lubricate. Use 30w non-detergent hydraulic oil with rust inhibitor additives. Crankcase has a fill sight glass located at rear, fill to center of sight glass only.
Fluid End	Use crankcase oil. 3 drops per month for plunger wick. Ports are located on top of crankcase.

Oil Changes

A pump oil change must be done after the first 50 hours of operation and every three months or 500 hours thereafter. The crankcase has a sight glass located at the rear; only fill it to center of sight glass. An engine oil change must be done after the first 50 hours of operation and every 200 hours thereafter.



Troubleshoot Steamer

CAUSE(S)	CORRECTIVE ACTION(S)
Water temperature too low	
The fuel filter is dirty.	Replace fuel filter.
The coils are packed with soot.	Drop burner assembly and blow air in the coil to clean out soot.
There is water in the fuel.	Drain and replace fuel.
The fuel pressure is low.	Check fuel filter. Increase engine rpm. Check filter.
The fuel pressure is weak.	Remove and replace fuel pump.
The fuel nozzles are dirty.	Remove burner gun and replace fuel nozzle.
The deflector plates in coil are burned out.	Remove coil from heater and weld new deflector plates (top and bottom).
Black smoke coming from heater	
Wrong type of fuel being used.	Drain and replace, using only clear diesel.
There is not enough air to the burner.	Check fan at the bottom of the boiler. Open louvers.
Fuel nozzle is dirty.	Remove burner gun and replace fuel nozzles.
Coils are packed with soot.	Drop burner assembly and blow air inside coils to clean out soot.
White smoke coming from heater	
No ignition or delay in ignition.	Check ignition transformer for spark. If spark is weak, replace transformer.
Too much air.	Close louvers.
Water in the fuel.	Drain and replace fuel.
Electrodes cracked, worn, or misaligned.	Remove burner gun and check electrodes for cracks, alignment and wear.
Burner not firing when switched on and water is coming out of wash gun	
Honeywell reset not tripped.	Reset and try again.
Fuel filter may be plugged.	Ensure fuel reads 130 psi and indicator on gauge is steady.
No power getting to burner.	Change fuse.



No spark in the igniter electrode tip.	Check that the high tension leads are connected and that the ceramic insulators are not cracked. Ensure cad cell is still in position.
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Multiple Choice Questions (Technical Quiz)

Complete the following test, and have it graded by your assessor. If any questions are answered incorrectly, your assessor will explain what the correct answer is, and why it is correct. Once you understand the correct answer, both the assessor and students initials are required to indicate that mentoring or coaching has taken place.

Question	Assessor's Initials	Student's Initials
1. The steamer is a wet high pressure cleaning unit. a. True b. False		
2. The volt meter must indicate how many volts before the burner can be turned on? a. 105 – 110 volts b. 105– 120 volts c. 110– 120 volts d. 110– 130 volts		
3. How long should the unit be preheated? a. 15 seconds b. 20 seconds c. 40 seconds d. 60 seconds		
4. When the System Reset button is depressed, it prevents the burner combustion chamber from loading up with fuel should ignition failure occur. a. True b. False		
5. The steamer utilizes how many types of hoses? a. 1 b. 2 c. 3 d. 4		
6. All hoses must be pressure and temperature rated? a. True b. False		
7. Which of the following PPE is required when working with high pressure water? a. Full Rain Suit b. Rubber Gloves c. Approved Rubber Boots d. All of the above		
8. Glycol can be used to clean equipment? a. True b. False		
9. The chimney vent must be opened prior to starting a job? a. True b. False		
10. For dry steam operations, which valves must be closed and opened? a. Close yellow valve and open red valve b. Close only red valve c. Close red valve and open yellow valve d. None of the above		



11.	The temperature and pressure gauges must be monitored during the operation? a. True b. False		
12.	During dry steam operations, condensate can be directed to either the atmosphere or water tank. a. True b. False		
13.	It is safe to wash yourself or someone else with a snap gun? a. True b. False		
14.	The barrel of a snap gun should be ____ if pressure is above 1,000 psi. a. 24" b. 36" c. 44" d. 48"		
15.	How often should you add three drops of crankcase oil to plungers? a. Once a week b. Once a month c. Once every three months d. Once a year		
16.	How often should the pump oil be changed? a. 3 months or 500 hours b. 6 months or 1,000 hours c. when operator thinks it needs it d. 2 months or 250 hours		
17.	Which of the following should be inspected for damage before each use? a. Snap Gun b. Dump System c. Crankcase d. A and B only		
18.	What is a cause of low water temperature? a. No power getting to burner. b. Fuel pressure is weak. c. Fuel filter plugged. d. All of the above.		
19.	What should be done if white smoke is coming from heater which is caused by too much air? a. Change fuse. b. Drain and replace fuel. c. Close louvers. d. None of the above		
20.	If no power is getting to the burner it may cause the burner not to fire when switched on and water is coming out of snap gun. a. True b. False		



Practical Assessment – Steamer Operations

This form is to be filled out by the assessor as they observe the student successfully demonstrate these items in order to be deemed competent.

Assessment Check List

Section 1			
The following items must be identified and their purpose, inspection requirements, and preventative maintenance must be explained. Failure to successfully explain inspection and maintenance requirements does not constitute a FAIL, but will require a mentorship agreement to bring the employees level of knowledge to an acceptable level.			
ITEM		YES	NO
1	Operating Control Panel		
2	Preheat Light		
3	Engine Warning Lights		
4	Volt Meter		
5	Burner On/ Off Switch		
6	Red Burner Indicator Light		
7	Temperature Control Panel		
8	Thermostat		
9	System Reset Button		
10	Reset Indicator Light		
11	Control Valves		
12	Chemical Hose		
13	Steam/ High Pressure Hose		
14	Hose Valves		
15	Soap and Glycol Tank		
16	Air Pressure Line		
17	Fill Line		



18	Vent Line		
20	Fuel Filter		
21	Water Tanks		
22	Water Valve		
23	Pressure Relief Valve		
24	Boiler		
25	Pump		
26	Engine		
27	Inverter		
41	PTO and Power Switch		

Section 2

The following tasks must be completed in the prescribed sequence. Any exceptions must be noted in the comments section with justification. Assessor will check YES column if the item was actioned satisfactorily, or circle the number in the NO column if it was not. If enough demerits are accumulated to warrant a fail, or employee performs an unsafe or dangerous action, the assessment may be terminated immediately. If necessary, all near-miss/incident reporting requirements must be met.

**Copies of the completed Daily Inspection, FLHA and Procedure must be attached to the assessment.*

TASK		YES	NO
1	Obtain work permits.		
2	Review Tool Box Talk, Permit, Pre-Job Meeting, FLRA, etc.		
3	Perform Daily Pre-Job Checklist for Steamer.		
4	Park unit in a well ventilated and convenient location.		
5	Ensure all power switches in OFF position.		
6	Open ball valve from water supply to the pump.		
7	Open roof hatch and lock in position.		
8	Close red valve and OPEN yellow valve (for wet steam).		



9	Set thermostat at 90°C (195°F)		
10	Turn starter key counter clockwise to preheat engine for 15 seconds.		
11	Idle for warm up approximately two minutes.		
12	Hook up high pressure hose to outlet of heater.		
13	Engage pump to flush out hoses.		
14	Flush high pressure hose.		
15	Disengage pump after flushing.		
16	Set up snap gun to end of hose.		
17	Re-engage pump.		
18	Open trigger gun ensuring water flow exists before increasing RPM.		
19	Increase engine RPM until it reads 110-120 volts.		
20	Turn on burner.		
21	Re-adjust throttle to read 110-120 volts.		
22	Check fuel pressure gauge ensuring it reads 100 psi (max 140 psi).		
23	Check temperature gauge ensuring it reads 180°F to 200°F		
24	Mix soap in chemical tank if using soap.		
25	Turn burner off before releasing engine throttle control.		
26	Decrease engine speed.		
27	Disengage pump.		
28	Close roof hatch and lock.		
29	Close water supply valve to pump.		

Comments:

Section 3



The following precautions must be observed at all times. Assessor will check YES column if the item was actioned satisfactorily or NO column if it was not. If the employee fails to adhere to any of these precautions at any time, it constitutes a fail and the assessment shall be terminated immediately. If necessary, all near-miss/incident reporting requirements must be met.		
PPE: Has all necessary PPE to perform task. PPE has been inspected and is in good condition. Proper PPE is worn at all times.	YES	NO
Backing: Operator- Proper spotter briefing and walk down of area with spotter before backing. window down, radio off, hearing protection removed. Confirmed hands signals with spotter before backing for the first time. Sounds horn prior to backing, keeps spotter in mirror, follows spotters direction.	YES	NO
Backing: Labourer- Proper spotter briefing and walk down of area with operator before backing. wears high visibility vest, confirms hand signals with operator before backing for the first time. Uses proper hand signals, does not walk backwards while spotting or repositioning, always facing unit while it is in motion.	YES	NO
Line of fire: Does not place themselves in the line of fire at any time. This includes standing off to the side when opening valves, removing caps, and disconnecting hoses. Does not place themselves directly in front of/behind unit while in motion. Uses whip checks on all connections	YES	NO
Communication: Has established and reviewed method of communication with co-workers to ensure equipment is operated safely and all hand signals are understood.	YES	NO
Paperwork: Properly complete or participate in the completion of any required paperwork. Have necessary paperwork completed prior to commencing a task.	YES	NO
If there are any items that are marked NO, it is a failure of the assessment	PASS	FAIL
Comments:		
Section 4		
Trainee must be able to clearly explain or demonstrate the proper procedure for winterizing the Steamer. Failure to successfully explain winterization requirements does not constitute a FAIL, but will require a mentorship agreement to bring the employees level of knowledge to an acceptable level.		
WINTERIZATION		



TASK		YES	NO
1	Close all water supply valves.		
2	Drain all water lines and hoses.		
3	Open valve on glycol tank.		
4	Startup engine.		
5	Remove snap gun from end of hose.		
6	Engage pump.		
7	Pump water out of system.		
8	Watch at hose end and when color changes put hose in top of glycol tank.		
9	Disengage pump.		
10	Shut down engine.		
11	Drain water tanks at correct location.		



Assessment Sign Off

All boxes must be completed before signing an employee competent.

- ☐ Expectation Letter Signed
- ☐ Minimum 100 hours of on the job training completed
- ☐ On the Job Practical Assessment Completed by an approved Assessor
- ☐ Has reviewed and understands the operator manuals
- ☐ Reviewed and understands Procedures and Safety Documentation
- ☐ Technical review and Knowledge Exam complete
- ☐ Training documentation sent to CEDA Training Department

Assessor

I, _____ have taken the below named employee through this Assessment, and he/she has successfully demonstrated competence in the areas identified.

Signature

Date

Student

I, _____ have completed this competency, including the on-job demonstration, practical assessment and multiple-choice questions. I understand the information presented and agree to follow all of the rules and procedures set out by CEDA.

Signature

Date



Revision Log

Revision Date	Section Affected	Changes Made
September 4, 2022	All	Updated Template, multiple changes throughout.



Training Change Request Form

Date: _____

Location: _____

Name: _____

Contact information: _____

Email/Phone number

Description

Please use the back of this sheet to make additional comments.

Section Name: _____

Page Number: _____

Description of Problem/ Suggested Resolution:
