Urban Farm Soil Steamer – User Guide

Purpose

A soil steamer uses high-temperature steam to sanitize potting mix, compost, raised beds, and in-ground beds by killing weed seeds, pathogens, and pests—without chemicals. This guide is tailored for urban farms operating in tight spaces, shared equipment settings, and around nearby residents.

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1. Overview

Target temperature: 160°F for 30 min

Do not exceed 200°F

Safety: Keep kids & public 15 ft away

Always wear PPE when handling equipment

Operation: Moist soil heats faster

Use chains and sandbags to limit steam that escapes

“Quick User Guide” is helpful to reference when starting and running the soil steamer.

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2. Safety Essentials

Urban farm sites often have limited space and public foot traffic. Ensure:

- Keep bystanders & children back 15 ft. minimum
- Wear PPE: heat-resistant gloves, boots, long sleeves, eye protection
- Never touch steam socks or hose fittings during operation — burn risk
- Use steamer on level ground only, ensure the level bubble indicates that it is level
- Do NOT run steamer indoors or inside hoop house without full ventilation
- Ensure water supply is clean and unrestricted

⚠ **Do not operate in dry grass or next to flammable materials.**

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3. Equipment Overview

Component	Function
Boiler/Steamer Unit	Creates steam under pressure
Steam Hose	Transfers steam to soil socks
Socks / Tarp	Distributes and contains steam within soil area
Condensate Drain	Removes water buildup
Temperature Probe	Confirms soil temperature

We recommend the use of chains and bricks/sandbags to seal the edges of the tarps on the soil.

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4. Steaming Raised Beds & In-Ground Soil

1. Irrigate lightly before steaming — moisture transfers heat better
2. Insert the temperature probes about 3” inches into the soil, in different parts of the bed to ensure even steaming
3. Lay out milk crates (optional), the steam socks, and connect to steam hose
4. Cover the bed with tarp

5. Seal edges with chains (stepping into ground helps create a nice seal) and/or bricks and sandbags.
6. Start steaming (see Section 5. Operating Instructions)
7. You are hoping for the tarp to lift off the soil, and create a “bubble” of steam that can circulate freely into the soil. If too much steam is leaking from the sides, this tarp “bubble” may not form and the soil may not heat evenly. A small amount of steam will leak out, but carefully readjust chains and sandbags if you see too much steam from one area or if the tarp isn’t lifting evenly after 10 minutes.
8. When soil reaches **160°F**, maintain temperature for 30 minutes. You may need to reduce the amount of steam being transferred into the bed.
9. Turn off machine
10. Wait until steam pressure drops to 0
11. Wait for beds and equipment to cool before moving equipment and setting up for next steaming, or begin disassembly for return

Notes for tunnels & paved sites

- Vent hoop houses to avoid condensation & structural drip
- On asphalt, lay down geotextile or plywood to protect surface from heat

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5. Steaming Potting Mix & Compost

Ideal for reused mix and pathogen suppression.

Potting Mix

1. Fill perforated metal tote or temperature-safe bin
2. Insert probe at center
3. Cover with lid/tarp
4. Steam until mix reaches **160°F for 30 minutes**

Compost

- Steam is only for pathogen control—not for finished curing stage
- Turn pile immediately after steaming for even treatment

6. Operating Instructions

See “A Farmer’s Guide to the SF-20 Steam Generator (AKA: Soil Steamer)” for machine use instructions and trouble shooting.

7. Verification of Proper Treatment

Method	What to Check
Temperature logging	160°F for 30 minutes minimum
Visual	Steam exiting edges slowly and evenly, and tarp has formed a “bubble” over the soil
Smell	Soil should have “earthy” smell — not burnt

⚠ Over-steaming reduces soil biology. Never exceed **200°F**.

8. Shutdown & Storage

1. Turn off machine
2. Wait until steam pressure drops to 0
3. Disconnect hoses only when cool
4. Open steam valve for venting and drain boiler
5. Let socks, hoses, and tarps dry before storing to prevent mold
6. Refill fuel tank to replace the fuel that you used

9. Shared-Use Expectations & Equipment Checkout

✔ Sign out unit through **Rental Agreement and Checklist for Rental**
✔ Inspect & photograph issues with equipment before and after use
✔ **Report issues immediately** — do not leave problems for next farm
✔ Return:

- Tarp dry

- Fuel tanks refilled
- Machine cleaned of soil/residue
- Checklist for Rental completed

🚫 **Do not loan to third-party farms without permission**

This material is based upon work supported by the National Institute of Food and Agriculture, U.S. Department of Agriculture, through the Northeast Sustainable Agriculture Research and Education program under Farmer Rancher Grant Project FNC25-1479

A Farmer’s Guide to the SF-20 Steam Generator

A Farmer's Guide to the SF-20 Steam Generator (AKA: Soil Steamer)

Note: *This document has been created to assist new users in the Cheshire County Conservation District Equipment Rental Program.*

This guide includes:

(1) Overview of the generator's function and setup
(2) Quick Guide to Use
(3) More Details
(4) Troubleshooting
(5) Video Resources.

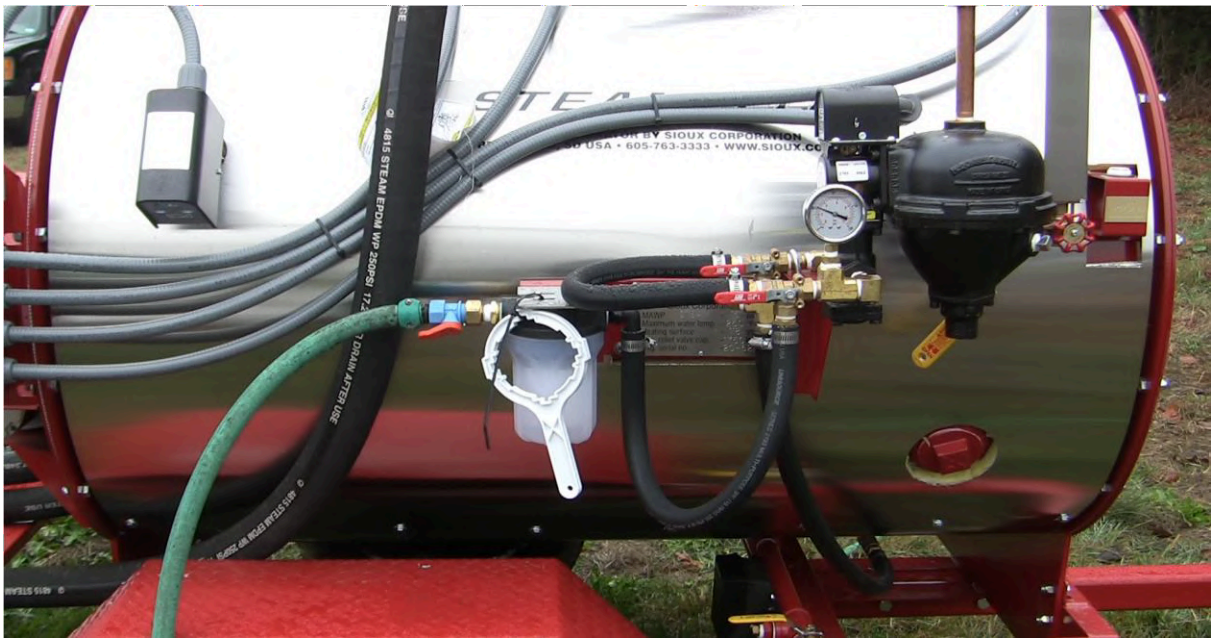
Overview:

When you look at the generator, standing on the right side with the gray control box in front of you, you will see:

1. The Soil Steamer:

2. The control box:

3.

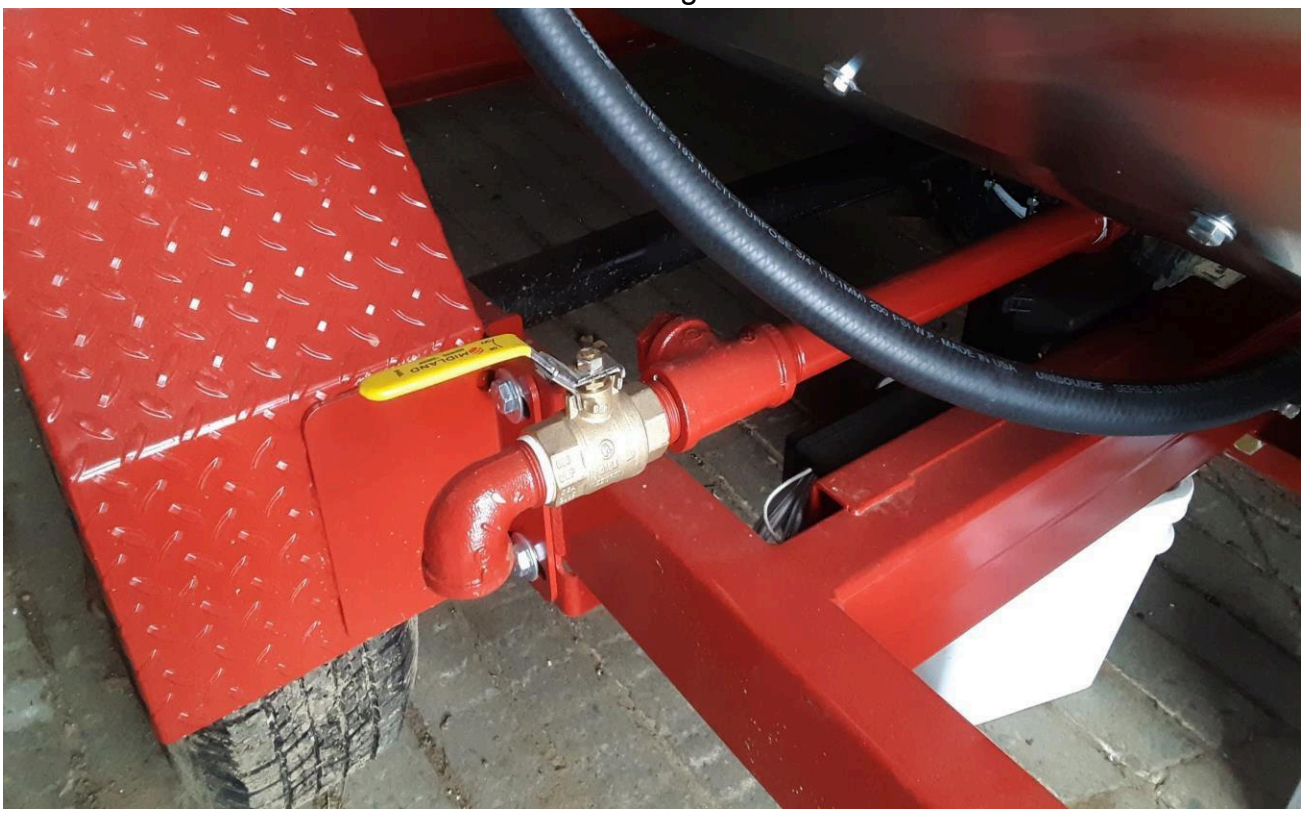


- The garden hose connection: Just to the right of the control box at about the same height. From the connection, water flows first through what looks like a filter housing, inside of which is not a screen, but actually a canister of white scale-inhibitor. Next, water flows into…
- The water feeder: a black housing that automatically delivers the right amount of makeup water into the tank, when steam is in use. There's a sight glass on the right side of the feeder. During steam generation, the water level should stay at the same level in the sight glass.
- Two steam pressure switches are located on top of the tank, in the middle. The one on the left has adjustable set points that control cut-in and cut-out pressures for the burner control **(Don't adjust them!)**. The one on the right has a maximum pressure set point, which will shut off the burner if the pressure starts to climb too high for some reason **(Don't adjust this, either!)**

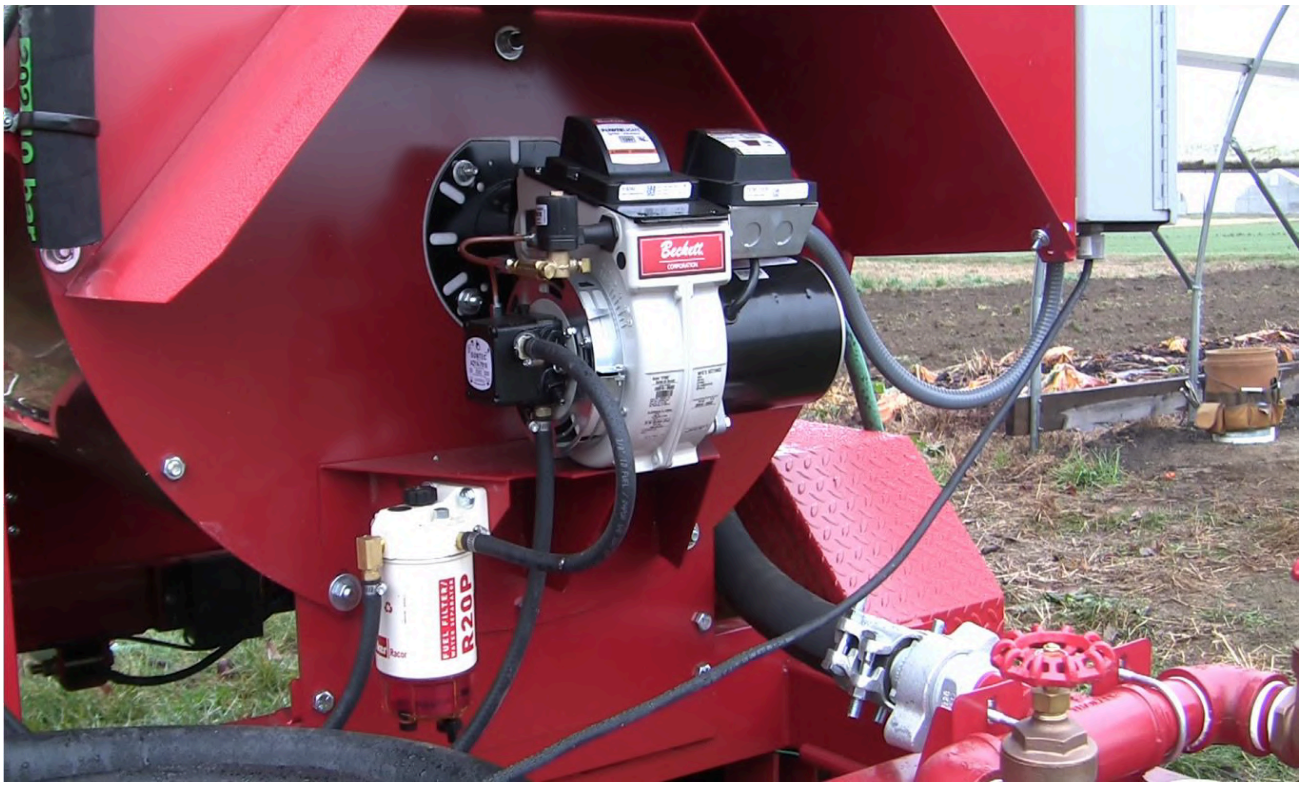
4.

- Next to the pressure switches, to their right, is a pressure gauge that shows what the actual steam pressure is.
- Next to the pressure switches, to their left, is a pressure relief valve like you see on standard hot water heaters.

5. The drain valve for the tank is down low to the right.



6. The burner is down to the left, at the back of the tank.
   - It's a "Beckett" brand burner very similar to ones that are used in home heating furnaces, but with a bigger nozzle.



7. The two steam discharge valves are down low, to the left and in back.

8. The diesel fuel tank is on the left side of the trailer.
o Fuel from the tank passes through a filter on its way to the burner.

To make steam in the generator, you will need:

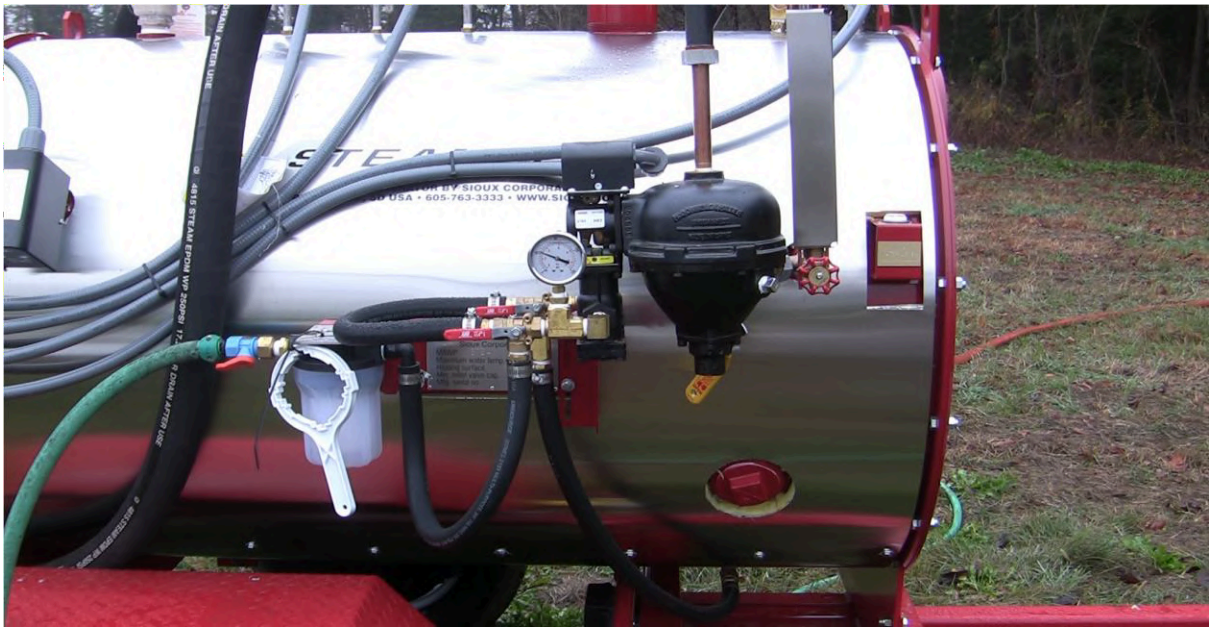
1. **A level place to park the trailer**, with no nearby fire hazards. There is a bubble level mounted on the front right side of the tank, near the top. Front to back levelling can be adjusted with the parking stand for the trailer. You'll have to disconnect your towing vehicle to do that. Side to side levelling is up to your own tools and creativity. If the tank isn't level enough, the interior water level won't be right for the boiler.

2. **Diesel fuel**, to supply the burner. The red fuel tank can be filled with on-road or off-road diesel. The tank holds 65 gallons of diesel and the burner uses around 4 gallons per hour of runtime.

3. **Electricity**, to serve the control switches and the burner ignitor. The required electricity is regular 120Volt AC, like you'd use for a home computer or household appliance on a 15-amp circuit and connects to the generator via a 35' plug-in power cord.

4. **A full tank of water**. The silver water tank holds about 135 gallons and your water supply connects via a regular garden hose fitting that's located on the right side of the unit, in front of the gray control box.

o **<u>To fill</u>:** Connect your supply; ensure that the drain valve for the tank, that's below and forward of the fill connection, is closed; ensure that one or both of the discharge valves, located at the bottom and back of the unit, are open so that pressure doesn't build up inside; shift the two red ball valve levers, located between your hose hookup and the black water feeder, up to a 12 o'clock position that bypasses the water feeder (the levers can move 90 degrees, from "9 o'clock" to "12 o'clock); fill the tank until water appears within the first inch or two at the bottom of the sight glass that's just in front of the water feeder.



o If you overfill, the space for steam to accumulate inside will become too small. At maximum overfill, water will pour out of the discharge valve.

5. **A good pair of work gloves** to protect your hands from hot surfaces, steam, or water.

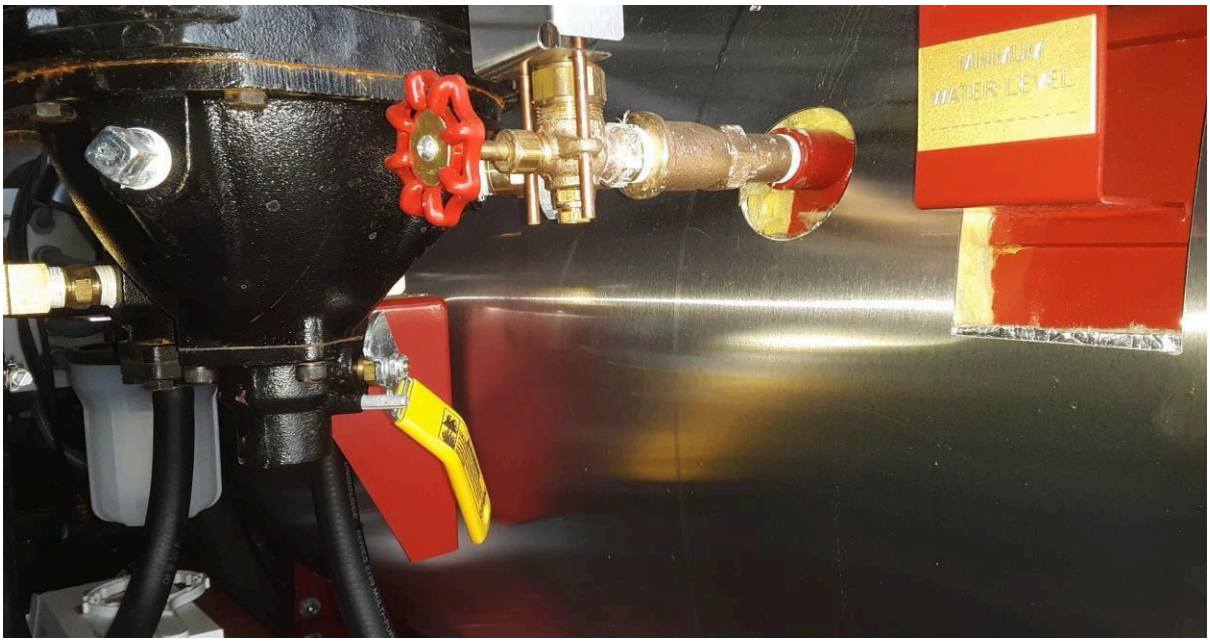
Once the setup is complete, and the generator is switched to "*on"* at the gray control box, it takes about 15 minutes of burner running to initiate steam production. Then, an automatic control switch will cause the burner to run only enough to keep the steam pressure between the setpoints of 4 and 12 psi. When the pressure falls to around 6, the burner will kick on and stay on 'til the pressure climbs up to the cut-out point of 12 psi. The amount of steam you call for, by adjusting one or both discharge valves, will affect this control. 10-12 psi is a good amount of pressure to keep the steam sock evenly full. Meanwhile, the water feeder valve will be using a level sensor to automatically keep makeup water supplied to the tank.

During operation, 5 safety switches, all routed through the gray control box, will automatically shut down the generator if parameters for safe operation are unsatisfactory. The parameters include: not enough water, too much steam pressure, and overly hot exhaust gases. At the end of the steaming run (or runs), all there is to do is shut off the main switch. If you're completely finished and ready to break down the generator for return, purge whatever steam is left by opening the discharge valves, let the generator cool for about 10 minutes, and then drain out the water from both the bottom drain valve and the water feeder valve.

Quick Guide to Use:

1. Complete the set-up requirements for safe location, fuel, electricity, and a full tank of water.

2. Turn on your water supply for the makeup water and move the red bypass levers to the left of the water feeder to 9 o'clock. Also ensure that the water feeder drain valve (yellow lever at the bottom of the water feeder) is shifted down to the closed position.



3. If the generator has not been run recently, prime the fuel supply by a few strokes of the plunger that’s mounted in the fuel filter.

4. Switch on the generator at the control box.

5. Close the steam discharge valves, if they’re not already.

6. Wait for steam. You’ll know it's there when the steam pressure gauge starts to move up from 0.

7. Ensure that your water supply is able to deliver 2-5 gallons per minute at 40-150 psi. There is a pressure gauge right at the water feeder inlet, and that’s where you want to see 40 psi. If your pressure is in range, the volume should be as well.

8. Use the steam by connecting the hose and sock to one of the discharge valves, adjusting the amount you’re calling for to keep the steam pressure around 10-12 psi.

9. When you’re finished with steam, switch off the generator.

10. Let some residual steam flow out through the discharge valve(s) before closing them.

11. If you're all done, and not just pausing between runs, disconnect electricity, open the steam discharge valves, and allow the tank water and boiler interior to cool. Then drain out the water tank by opening the lower drain valve. Be cautious about the potentially HOT water before you attempt to drain the water tank. Open the water feeder drain valve as well.

More details:

1. The water feeder does have a screen filter inside of it that serves as an extra safety for keeping water clean in the boiler. The water you put in should be filter-clean already.

2. Switches, Indicator Lights, and Reset Buttons:

The following text, about the indicator lights, was adapted from a Sioux Corporation Instruction Manual:

INDICATING LIGHTS: The following lights are located on the gray electrical enclosure box. The instructions below describe their function and aid in troubleshooting what switch may not be functioning.

1. Manual Reset Level Switch: This safety switch monitors the water level and if the level switch on the water feeder fails to shut the burner off in a low water condition, this switch will shut power to the burner and must be manually reset.

2. Water Feeder Level Switch: Located on the top of the water feeder, the switch will shut off the burner if the water level is below the minimum level.

3. Auto Reset Pressure Switch: Located on top of the tank, the pressure is set to the desired pressure and if the pressure is above the setting the burner will remain off until the pressure has dropped below this setting less the "Deadland" setting Ex.10 psi – 4 psi deadland, the burner will shut off at 10 and back on at 6 psi.

4. Manual Reset Pressure Switch: If the pressure reaches 15 psi the burner will shut the burner down and the red switch must be pressed to reset the switch and the burner will restart.

5. High Exhaust Temp Limit: If the exhaust gases reach a temperature above 700°F this limit will shut the burner of and must be pushed to reset the burner.

INDICATOR LIGHTS ON THE GRAY BOX: WHEN ALL GREEN INDICATORS ARE LIT ALL COMPONENTS ARE OPERATING NORMALLY IF SOME INDICATORS ARE NOT LIT, CHECK THE COMPONENT CORRESPONDING TO THE LEFT MOST UNLIT INDICATOR IF NO INDICATORS ARE LIT CHECK THE HIGH TEMP RED INDICATOR OR MANUAL RESET LEVEL SWITCH.

Troubleshooting:

If you're having trouble, better to seek advice from folks who set up the rental with you before you pull out any tools and dive in. Please feel free to reach to any of the partners on this project:

Cheshire County Conservation District (CCCD)
Amanda Littleton: District Manager Amanda@cheshireconservation.org

Picadilly Farm – Winchester, NH
Bruce Wooster: Owner & Farmer bruce@picadillyfarm.com
(603) 236-1930

National Center for Appropriate Technology (NCAT)
Andy Pressman: Northeast Regional Director
Andyp@ncat.org
(479) 587-3475

Video Resources:

- Steam-Flo Startup Video from the Sioux Corp: https://www.youtube.com/watch?v=_G5FBdN2ayw&t=101s
- Soil Steaming Video from the Sioux Corp: https://www.youtube.com/watch?v=J_EC-wvtuCc
- Soil Steamer Virtual Workshop from the CCCD: https://youtu.be/M0mbyEOlO70

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(created March 2021)

Rental Agreement

COMMUNITY SHARED SOIL STEAMER RENTAL AGREEMENT

This Rental Agreement ("Agreement") is made between **Detroit Produce Club** ("owner") and

_____ **(Farmer/Organization)**("renter") for the temporary use of a **Soil**

Steamer Unit ("Equipment").

1. Rental Term / Condition of Equipment

- Checklist is completed and signed at time of check out and time of return.

2. Rental Fees

- Rental Fee: $_____ per day / $_____ per week
- Reservation Deposit (non-refundable; applied to rental fee): $_____
- Security/Damage Deposit (refundable if no damage): $_____
  All fees must be paid **in full before the equipment leaves Owner's premises.**

3. Usage Requirements

The Renter agrees to:

- Operate the soil steamer only according to the **provided safety/operating instructions**.
- Use clean water only—no additives, chemicals, fertilizers, oils, or amendments.
- Keep the equipment covered and protected from weather when not in use.
- Prevent freezing, dry-firing, and over-pressurization.
- Never leave the equipment unattended while operating.

5. Transportation

Renter is responsible for:

- Safe loading and unloading
- Proper tie-down and securing during transit
- Providing power hookups and water as needed on-site (a generator is available for rental)

** Owner is not liable for damage to vehicles, trailers, or property during transport.

6. Cleaning Requirements

Before returning Equipment:

- Empty water tank and drains
- Leave hoses, socks, and tarps out to dry before folding and returning
- Pack manual, temperature probes and other equipment into black tool box

7. Damage, Loss, or Theft

Renter assumes all risk of:

- Damage to Equipment: renter agrees to pay **full repair costs** if equipment is damaged due to negligence or misuse.
- Loss, misplacement, vandalism, or theft: renter agrees to pay **full replacement cost** if equipment is lost, damaged beyond repair, or not returned.

8. Indemnification & Liability

Renter understands that the Equipment operates under **high heat and high pressure** and can cause **fire, burns, equipment damage, crop damage, and injury**.

Renter assumes **full responsibility** for:

- Safe setup and safe site conditions
- Supervision of all operators
- Any injuries, accidents, or property damage resulting from use

Owner, and any participants in the Community Shared Equipment program, are **not responsible or liable** for:

- Injury or death of users
- Damage to crops, structures, tools, vehicles, or land
- Loss of income or production due to steamer performance or failures

9. Cancellation Policy

- Cancellations made at least 1 day prior receive refund of rental fee (excluding reservation deposit).
- Cancellations with less than 3 days notice forfeit full reservation deposit fee.

10. Breach of Agreement

Any violation of this Agreement may result in:

- Immediate termination of rental
- Loss of deposit
- Future rental privileges revoked

11. Signatures

Renter Name / Farm	_____	**Owner Name**	_____
Renter Signature	_____	**Owner Signature**	_____
Date	_____	**Date**	_____

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Checklist for Rental

CHECK-OUT & RETURN INSPECTION FORM — SOIL STEAMER

Borrowing Farm / Contact Name: _____

Phone: _____

Email: _____

Date Out: _____ (complete parts A, B & E)

Date Returned: _____ (complete parts C, D & E)

Farmer had training on how to properly use soil steamer ☐ YES

A. Parts

Item	Present at Checkout	Present on Return	Notes
Soil Steamer Main Unit	☐	☐	
Generator	☐	☐	
Steam Hose (1x)	☐	☐	
Steam Sock (1x)	☐	☐	
Tarps (4x) and bucket of chains	☐	☐	
Thermometer Probe	☐	☐	
Tool Box	☐	☐	
Safety Manual	☐	☐	
Fuel Tank Level of Generator (DIESEL)	_____	_____	

Fuel Tank Level of Steamer (DIESEL)	_____	_____	

B. Condition at Checkout

Condition	Notes
Visible dents or damage	
Leaks (water/fuel/steam)	
Electrical condition / plug	
Hoses / socks condition	
Burner / generator	
Pressure relief / gauges	
Other concerns	

Renter initials: _____ Owner initials: _____

C. Condition Upon Return

Condition	Good	Needs Attention	Notes
Equipment cleaned	☐	☐	
All hoses empty & drained	☐	☐	
Mud/debris removed	☐	☐	
Tarps dry	☐	☐	
Gauges working	☐	☐	
Leaks	☐ None	☐ Yes	

Damage or missing items	☐ None	☐ Yes	
Operational issues to report	☐ None	☐ Yes	

D. Required Follow-Up

☐ No repairs needed

☐ Repairs needed — estimated cost $_____

Responsible party (circle): Renter / Owner / Shared cost / Unclear

E. Signatures

	Checkout	**Return**
Steamer Coordinator	_____	_____
Borrowing Member/Farm	_____	_____

NORTHEAST SARE

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