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1-WINTER DRILLING PROCEDURE

▫ **PPE Required: Hard hat, ear plugs, or muffs, safety glasses, winter gloves, steel toe winter boots, reflective clothing.** Winter clothing with reflective material. ice cleats(if necessary)
Step 1. Upgrade standard work clothing and PPE to an insulated version.
Step 2. Ensure crew trucks, sleds, side by sides, dozers, buggies are warmed up prior to operating.
Step 3. Pick up trucks and dozers equipped with block heaters should be plugged in when not in use.
Step 4. Cage will be installed to the top of the drill tower and a parachute or large tarp will be secured to it and reach the top of the drill shack to protect from the elements.
Step 5. Drill shacks will be banked with snow by the dozer to cut down on wind / floor freezing.
Step 6. Frost fighter heater will be used to provide extra heat into the drill shack powered by generators mounted on the rod sloop.
Step 7. Water tanks will be used for winter drilling along with water supply trucks.
Step 8. Pump shacks will be outfitted with 12volt or propane coil stove burners and always remain on when snow is on the ground. (Water tank temperatures can be monitored, and stove shut off accordingly)
Step 9. Waterline will be installed 100ft at a time while each hose is blown through before connection water then buried with snow to insulate it.
Step 10. Waterline joints will be marked with flagging tape on trees or scrap wood so they can be located as fast as possible if the pump shuts down.
Step 11. Floor salt will be used on the drill floor to reduce slipping hazards along with the chipping of ice as it accumulates.
Step 12. When draining the water system in the drill for moving or shutting down, the hydraulic cooler plug will be removed, and the cooler shall be filled with antifreeze.
Step 13. Waterlines will be drained and blown through immediately after cutting off the water supply or deciding the supply pump cannot be started before the line will freeze.
Step 12. Propane tiger torches with lighters / sparkers will be located throughout the project and resupplied as needed. (these must be ordered before supply runs out)

Step 13 Shift changes will take place at the drill while any water system is active, no exceptions!
Step 14. Water tanks, pumps and coil stoves are always the responsibility of the driller and helper no matter who else might assist with them throughout the project.
Hazards:
Frost Bite, blown coil stoves, frozen / split hydraulic cooler (oil spills), slips and trips, motor damage, steam burn
Controls:
Insulated clothing, constant checks of water, SWP, floor salt, Warming vehicles, turn burner off if water stops.

DO'S	DON'TS
-Bury waterline to insulate it.	-Pump water into a hot coil stove
-Wear layers of clothing to adjust to weather.	-Move equipment without warming it up
-Review how to drain water system	-Drive over active waterline (it can blow a line)

2-COIL STOVE PROCEDURE

SECTION ONE ***PROPANE FIRED***	

Description

The Propane model utilizes the major improvements of the same easy flow coil design.
An improved torch design provides an efficient and stable flame.
The torch, a torch holder flange adapter, a propane regulator and lines, plus any multi-line parts required for the project will be included with the Waterline Heater.

WATER HEATER PLACEMENT

Install heater in enclosure or pumphouse with PLENTY OF VENTILATION
Connect 7-inch stovepipe to exhaust and include a wind and rain deflector on the exit end.
Heater should be level for optimum operating results.

PRIOR TO PREPARING HEATER FOR USE

1. Locate PROPANE HOLDING RACK a minimum of 10’ (ten feet) from the pump shelter/shack and heater (never put Propane bottles inside the pump shack).

Insure that the tank is turned off completely.
Insure REGULATOR is attached firmly to main tank and that any hose/hoses are properly attached to the REGULATOR and any HOSE SPLITTER.
Attach the TIGER TORCH to the open end of the hose/hoses and insure that it is in the off position.
Turn the main PROPANE TANK on completely and insure that there are no leaks along the entire length, around the REGULATOR and at the main PROPANE TANK. If you are unsure, use water or soapy water around all JOINTS/FITTINGS and OBSERVE for any bubbles. Adjust accordingly.

STARTING THE WATER HEATER

Attach the TIGER TORCH into the bracket on the Water Heater intake end. Tighten the three bolts onto the torch until it is firmly in place.
Attach the ‘inlet’ and ‘outlet’ water hoses to the marked fittings on the side or bottom of the WATER HEATER.
Start the water flow, thru the Heater.
Open the ADJUSTMENT valve on the Tiger Torch slightly.
Using either a BARBEQUE LIGHTER or STRIKER, light the Torch from below to avoid burning your fingers from the lighter. (In some instances you may have to light the Tiger Torch prior to inserting into the bracket, use extreme caution).
Hang or route the Propane and Tiger Torch hose so they are out of the entrance way, away from extreme heat, out of the way of any potential Ice Build-Up, etc. Keep it neat.
Insure that there are no flammable products nearby, nor any material that may blow onto, into or around the Water Heater.
Adjust the Tiger Torch valve to the desired force.
Remain at the Water Heater for a few minutes to observe that all is operating properly.

CHANGING PROPANE TANKS

Turn off all propane bottles.
Turn off Tiger Torch control valve once remaining gas has extinguished.
Loosen and remove Line Fitting from Main Tank (Reverse Thread).
Remove empty tank from stand to avoid mis-counting of what is full and what is not.
Move and attach Line and Fitting to the replacement bottle.
Once the Line and Fitting are securely fastened, open new bottle and listen/smell for any leaks.

If no leaks, open bottle valve fully.
Open Tiger Torch valve slightly and light.
Adjust the Tiger Torch valve to the desired force.

DRAINING WATER HEATER

Turn off all propane bottles.
Turn off Tiger Torch control valve once remaining gas has extinguished.
Remove Tiger Torch from the Water Heater, insuring that the retaining bolts are tightened back in, avoiding loss of the bolts.
Allow cold water to flow through until the Water Line Heater has cooled down.
Remove the 'inlet' and 'outlet' hoses.
Fill the coil with 'RECREATIONAL VEHICLE ANTI-FREEZE' which is NON TOXIC.
Ensure that Non Toxic Anti-Freeze flows from the 'inlet' and out the 'outlet' or vice versa.
This will indicate that the entire coil is full of Non Toxic Anti-Freeze and that all, supply water has been displaced, preventing a frozen coil.
These units are not to be steamed.

OIL FIRED

Description

The Oil fired model is simple to operate and is virtually trouble free.
It comes with an advanced technology forced air oil burner with a high-limit safety switch for maximum efficiency;
120 Volt AC and 12 Volt DC Burners are available (For our purposes we use the 12v system).
The 12 Volt burner is powered by a battery and alternator system.
The alternator is driven by the supply pump.
The power cords are all heavy duty.
With the flick of a switch it ignites and delivers hot water in 3 minutes.
HIGH LIMIT SAFETY SWITCH:
The Oil Fired Water Line Heaters are available with a High Limit Safety Switch.
This switch is designed to trip if the water temperature exceeds a preset temperature.
The Propane Fired Water Line Heaters are available with a Safety Shut-Off Torch.

WATER HEATER PLACEMENT

Install heater in enclosure or pumphouse with PLENTY OF VENTILATION.
Connect 7-inch stovepipe to exhaust and include a wind and rain deflector on the exit end.
Heater should be level for optimum operating results.

PRIOR TO PREPARING HEATER FOR USE

Locate FUEL DRUM on the outside of pump shelter/shack whenever possible.
In extreme temperatures, the drum stand can be located inside as long as the heater and pump are on opposite sides of the structure. (Insure there are no leaks from the drum or fuel lines and that all safety equipment is quickly available, including SPILL KIT).
Insure that the feed valve is in good shape and in the off position.

Insure FUEL FILTER is new.
Insure all fittings are tight and leak free.
Put down Environmat under the entire FUEL STAND assembly, inside the spill tray.

STARTING THE WATER HEATER

Attach the burner to the three studs at the 'inlet' end of the Water Line Heater.
Install the Fuel Line in a convenient location from the fuel source/drum.
Connect the fuel source/drum line to the 'inlet' port of the fuel pump on the side of the burner.
To ensure proper operation of the burner it is CRITICAL to have a good fuel filtering system and to change filters regularly.

HIGH LIMIT SAFETY SWITCH:

If the burner is equipped with a high limit safety sensor, plug the two pronged connector from the burner to the corresponding plug attached to the Water Line Heater. These two connectors MUST BE CONNECTED IN ORDER FOR THE SYSTEM TO WORK.
BURNER IGNITION:
Start the flow of water through the coil.
Locate the bleeder nipple on the burner fuel pump positioned below fuel 'inlet' port and open it one half turn.
Start burner by turning toggle switch to 'ON'.
Turn 'On' the VCT dial to the desired temperature
Observe fuel flow at the bleeder until it is free of bubbles, then close the bleeder nipple and the burner will immediately ignite. This initial priming procedure is only necessary when the burner is fired for the first time at a new location OR if the fuel supply has been allowed to drain out.
Once the burner flame is operating, adjust the air/fuel mixture as follows and also refer to manufacturer's recommendations as some burners may vary.
Loosen screw(s) retaining air shutter and slowly open adjustment band until no trace of smoke is visible in exhaust.
Then slowly close down shutter until the point at which a trace of smoke appears in exhaust.
Again, carefully open shutter to 1/8" beyond point at which smoke trace disappears and lock in position with retaining screw(s).

Important: Solid state burner ignition is designed to withstand a wide range of operating conditions including prolonged humidity. However, it will NOT sustain repeated subjection to direct water spray (e.g.
torrential downpour, spray from hose leak, etc.).

DRAINING WATER HEATER

Turn off fuel oil supply.
Turn off fuel control valve on Burner once remaining Fuel Oil has extinguished.
Remove Fuel Oil line from the Water Heater.
Allow cold water to flow through until the Water Line Heater has cooled down.

Remove the 'inlet' and 'outlet' hoses.
Fill the coil with 'RECREATIONAL VEHICLE ANTI-FREEZE' which is NON TOXIC.
Ensure that Non Toxic Anti-Freeze flows from the 'inlet' and out the 'outlet' or vice versa. This will indicate that the entire coil is full of Non Toxic Anti-Freeze and that all, supply water has been displaced, preventing a frozen coil.
These units are not to be steamed.

3-FROZEN WATERLINE PROCEDURE

1.1. **Frozen Water Lines**

If during drilling it is detected that the line is freezing, it is important to consider the following steps:

1. Disconnect the line that cools the hydraulic system.
2. Disconnect the water swivel line and connect to the water cooler output line so that the water begins to recirculate in the drill, using a fitting adapter.
3. Check your pump station(s).

It is important to consider the care of the water line, not to exceed the pressure recommended by the manufacturer.
It is recommended to bury the water line in snow to insulate, to avoid direct exposure to winds and low temperatures that favor freezing. To know where the water line fittings are when under snow (flagging tape can be used).
The winter season must be anticipated in the month of September, so the pump houses for winter operation must be ready in time for their use in the projects, so that they start to be operational from the first cold weather.

Basic tools needed:

10 and 12 mm allen key
- Stilson 18
- Crescent key
- Tool to remove the bronzes

Conditions for pump and heater

It is very important to carry out daily inspections of the pump, to check that it is in optimal operating conditions. What should be inspected?

Pump

Normally, for water supply in drilling rigs, 2 kinds of Kubota pumps are used; D1105 Superpump and the 0C95 E4.

For the review, the following should be considered:

i. The belts are adjusted correctly, with the necessary tension.
ii. Check valves.
iii. That the suction system is free of rocks/debris, that the foot valve has a well-installed protection mesh, to prevent the entry of materials.
iv. The suction hose must be lined with thermal insulation.

Heater

During the inspection the following points should be considered:

-fuel levels.

-That there is a good flow of water, without leaks, since the heating system can overheat due to lack of water, and it can be dangerous due to the production of hot vapors.

-If the heater runs out of water flow and the temperature of the coil has risen excessively, you must wait a few minutes before starting the pump, to avoid critical risks. If the coil stove is cherry red, to keep the water flowing in the line provisionally pump water directly into the waterline bypassing the coil stove for some time while the coil stove cools down.

Electrical system

-It must be confirmed that the electrical system is working in good condition, with the cables in good condition, and the battery charged, because if the electrical section suffers a breakdown, the heater turns off and the water lines freeze in minutes.

-It is necessary to know the correct way in which the alternator should be connected, because if the connections are connected backwards, the battery dies and the heater stops working.

Associated risks

Locative: Falls, slips, falling objects.
Mechanic: Cuts, entrapments, blows, projection of particles.

Critical Risk: Burns, explosions, fires, burns by steam, frostbite.

Ergonomic: Prolonged postures.
Biological; Contact with harmful fauna, hypothermia to exposure.
Psychosocial: Stress, deficiency of work skills. Disorientation from hypothermic shock

Verifying compliance of this procedure:

1.1. The process leader is responsible for validating the procedure for the different work areas in order to identify compliance or possible deviations in occupational health safety standards.

1.2. The HSE manager and you must review and carry out the necessary scopes so that the procedure meets the needs of the operation to avoid incidents related to the task.

1.3. The site supervisor must verify in the field that the staff knows and works under the standards set out in this procedure, as well as encourage worker participation and commentary to strengthen the culture of prevention and avoid risks involved in this operational task.

1.4. The HSE department, together with the operations representatives, must spread the content of this procedure, and also provide training to the personnel involved in the tasks described in the document.

Author	***Description of version changes (Control of changes):***	***Revision Control:***	***Date:***
OPERATIONS	2 MERGE ***CA-PR-OP-14. E Winter Drilling Procedure, CA-PR-OP-06. E Frozen Waterline Procedure and CA-PR-OP-07. E Winter Coil Heater Procedure into this procedure***	2	01/07/2025