

Initial attack fire equipment for woodland owners

By Don Sohler

After the 2020 fire season, there has been talk among members about having fire protection equipment on our properties. With that in mind, I have compiled **3** lists for consideration:

- 1. Commercially purchased equipment that meets ODF and NFPA standards** for logging operations. The prices are listed for complete slipon units with tank, pump and hose reel with 250 feet of hardline ready for use. Either of these two would be used on a flatbed truck, trailer or in case of the 300-gallon tank, a one-ton rated or larger pickup. Remember that 300-gallons weighs in excess of 2500 pounds with tank.

- 300-gallon
Cost ranges from \$15,000 to \$18,000
- 500-gallon
Cost ranges from \$18,000 to \$22,000



Complete skid unit

- 2. If you choose to build it yourself, listed below are individual equipment pieces that meet the NFPA standards.**

TANKS (**Note:** Using a tank without baffles in steep terrain can be dangerous)

- 300-gallon commercially manufactured Polypropylene
Cost ranges from \$4,500 to \$5,500
- 500-gallon commercially manufacture Polypropylene
Cost ranges from \$8,500 to \$9,500



Tank with 10-gallon foam compartment

Note: Both of these tanks meet NFPA standards with baffling. Most fiberglass tank manufacturers have stopped producing tanks and are now either out of business or are manufacturing the Polypropylene tank.

PUMPS

Must meet ODF standards of 20 gallons per minute and 115 PSI at the pump.
Volume pumps do not meet this standard.

- Price varies widely from \$2,000 to \$6,000

Examples that meet ODF standards are Waterax Brand BB4, Striker Series, Ace Brand GE 800 Series, Waterus Series, Hale Brand and Davey Twin Impeller sold by Darley Pumps.

HOSE REELS

- Hand Crank
Cost ranges from \$1,000 to \$1,200
- Electric
Cost ranges from \$1,800 to \$2,200

Note: Both meet NFPA requirements of 250 ft. of $\frac{3}{4}$ " pre-connected hose with nozzle ready for immediate use.

HOSES (*$\frac{3}{4}$ " hard line pre-connected booster hose*)

Cost ranges from \$1,000 to \$3,000 for 250 feet

PLUMBING

Most, but not all, commercially produced fire equipment will have Stainless Steel plumbing with 3-piece replaceable valves. The Stainless plumbing is used due to the corrosive properties of the foam agents that are being used. The 3-piece valves allow for plumbing repair without having to unthread the plumbing.

- Stainless Steel costs are unattainable at this time due to inflationary factors.
- Brass Valves (3-piece)
 - $\frac{3}{4}$ " Cost ranges from \$200 to \$250
 - 1 " Cost ranges from \$200 to \$300
 - 1-1/2 " Cost ranges from \$250 to \$350
 - 2" Cost ranges from \$300 + plus

Note: There is no standard for meeting ODF rules, but the cost of these brass valves reflects the pressure that they must withstand, sometimes as high as 250 to 300 PSI with high-pressure pumps. Look for these letters when purchasing valves that could withstand high pressure: "W.O.G." which stands for WATER, OIL, GAS. In the past, I have used valves with a rating of 500 W.O.G. as a safety margin when mating with a high pressure pump.

3. **Agricultural equipment that does NOT meet NFPA standards but will work for initial attack on private property. This category is where most small woodland owners will fit.** The equipment could serve a double purpose. This includes Honda volume pumps such as those sold at farm stores that have a pressure rating of 45 to 65 PSI that could be used for irrigation in the spring time and dewatering in the winter months, high-pressure piston pumps for pressure washing equipment and electric 12-volt pumps that could be used for spraying.

TANKS (**Note:** using a tank without baffles in steep terrain can be dangerous)

- 50-gallon Plastic
Cost ranges from \$100 to \$200
- 100-gallon Plastic
Cost ranges from \$150 to \$250
- 275-gallon IBC Tote
Cost ranges from \$100 to \$300
- 300-gallon Plastic
Cost ranges from \$800 to \$1,000
- 500-gallon Plastic
Cost ranges from \$1,000 to \$1,500



PUMPS

- Cost ranges from \$500 to \$2,000

There are 6 or 7 types of pumps that are available in the Agricultural Industry: Piston, Rotary, Roller, Diaphragm, Gear, Centrifugal and Vane. Since these pumps are being converted for fire use and out of their normal spectrum of use, there are pros and some cons for each style. What matters in the end is that they will pump water if there is a burn pile that is spreading, a lightning strike that has caused a fire, or if you should come across an abandoned campfire.

The primary difference is that Piston, Rotary, Gear and Roller need clean water. Tolerances in the pumps listed are very close, within a few thousandths of an inch. That is about the thickness of a sheet of newspaper. Centrifugal pumps are more forgiving when refilling from a pond or creek. Tolerances in the impeller and volute allow for small pieces of grit to pass through without harming the performance. If you don't draft from a creek or pond to refill your tank and instead fill from your well, then this is a non-issue.

When purchasing a pump, the maximum pressure that the pump can deliver will sometimes be listed as Head Lift instead of PSI. Some pump performance is listed as Pressure in "BAR".

Note: These pumps do NOT meet the ODF standards for logging, but would work for initial attack.

Conversion factors: PSI to Head lift: $\text{PSI} \times 2.31$
Head lift to PSI: $\text{Head lift} \times .433$
Bar to PSI: 14.5

Examples: A pump has a pressure rating of 64 PSI. $64 \times 2.31 = 148$ ft. of lift
A pump rating in feet of lift of 131 $\times .433 = 57$ PSI
A pump Bar rating of 8.3 $\times 14.5 = 120$ PSI

HOSE REELS

- Hand Crank Air Hose
Cost ranges from \$50 to \$100
- Spring Rewind Air Hose
Cost ranges from \$75 to \$150

HOSES

- Pressure Washer Style
Cost ranges from \$1.00 to \$2.00 per foot
- $\frac{3}{4}$ " Synthetic with garden hose fitting
Cost is about \$25.00 for 50 feet
- 1" Forestry Hose with NPSH thread
Cost is about \$90 for 50 feet
- 1-1/2" Single Jacket Fire Hose
Cost ranges from \$150 to \$250 with NH threads for 50 feet

PLUMBING

Black Iron pipe can be substituted for Stainless Steel so long as a minimum amount of foam is used, or the Tank and Pump are flushed with clean water after use. A good substitute for Black Iron pipe is agriculture wire bound hose, or hydraulic hose on the suction side of the pump.

3-piece valves rated for 150 PSI are available locally through farm and plumbing supply stores for about \$30.00. Just make sure you are not using this valve on the discharge side of a high-pressure Piston or Rotary pump.



Top and side view of valve

Examples of members' equipment:

Scott Hayes - Fire skid for his side by side. Cost about \$800. 65-gallon tank with hand crank reel and a pressure washer pump that delivers 2.5 gal/minute @ 3000 PSI. Mounted on a pallet for quick loading/unloading with tractor bucket.





Don Sohler – ATV with 25-gallon spray tank 1.5-gal/minute @ 40 PSI. Also carries a chainsaw, 5-gallon backpack with foam nozzle and light-weight 2-cycle pump that can refill the spray tank from creek or pond in 2 minutes. Uses garden hose instead of fire hose.

Second photo shows a home-made water level indicator made of clear tubing with a plastic Salmon Egg that floats and is visible from 20 feet.



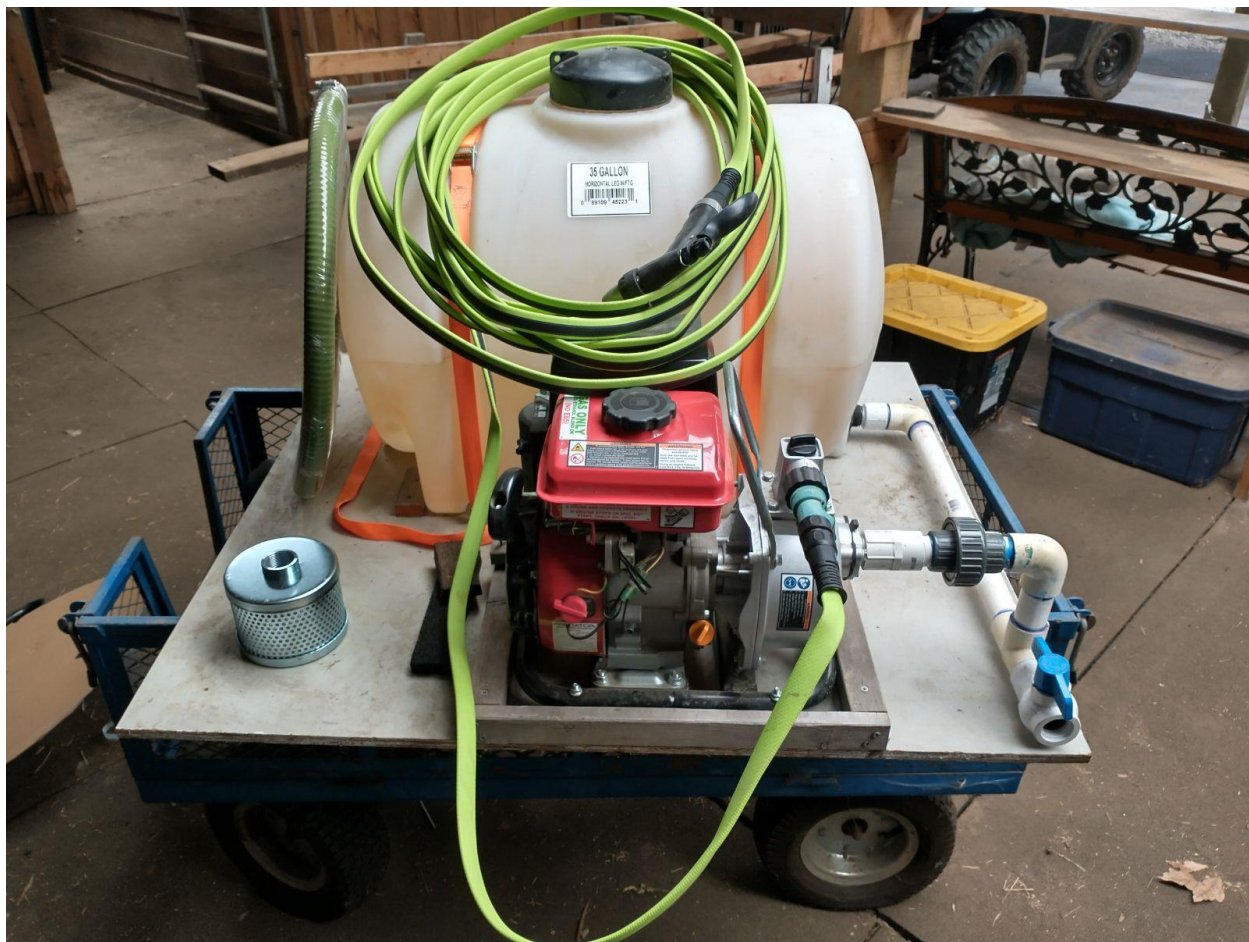


Richard and Anne Hanschu: Their fire-fighting unit has a Honda engine, 70-gallon water tank and a fire-fighting pump. It was purchased in 2005 for \$4,970 from Workensport in Bend, OR. It was originally designed to slide into a pickup bed and was redesigned to fit onto a 4 x 8 utility trailer.

Additions:

- 100-gallon water tank and 300 feet of high-pressure herbicide hose with battery powered retractable reel.
- Brass valves to be able to pull from either 70-gallon or 100-gallon tanks as well as transfer from one tank to the other and the ability to direct fluid to fire hose or herbicide hose.
- Unit carries 5 gallons of class A foam used to apply foam to water to fight fire. Inline foam dial concentrates foam to desired amount.

Cost with additions for both fire fighting and herbicide use \$7,970. Richard's thoughts are that he would rather pay \$7,970 for a unit he uses every year rather than \$4,970 for a unit he would hope to never use!



Gordon Dana

Here is the slip-on unit I put together for our UTV. Total cost was \$377:

35-gallon tank \$140

Harbor Freight pump 35 GPM \$130 (The pump has a head pressure rating of 95 feet which converts to 41.5 PSI).

20' suction & foot valve \$39

Pipe & fittings \$30

3/4" hose & nozzle \$30

Straps \$8

Scrap plywood \$0. I rigged it so the pump is easily removed for use in our creek & sized the tank for short term initial attack & low center of gravity. The dump valve allows for tree or shrub watering as well.

GLOSSARY

BAR	Metric measurement equal to 14.5 PSI.
Head Lift	The pounds of pressure needed to push water to a given elevation not counting friction loss.
IBC	Intermediate Bulk Container.
IFPL	Industrial Fire Precaution Level.
METRIC THREADS:	Measured by the number thread or fraction of in a Millimeter. Example: M14 X 1.5 or M14 X 2.
NC	National coarse thread.
NF	National fine thread.
NFPA	National Fire Protection Association.
NH	National Hose, or sometimes referred to as NST, National Standard Thread.
NM	Newton Meters. Often used with torque wrenches. Example: 50-foot pounds of torque = 67.8 Nm.
NPSH	National Pipe Straight Hose. Sometimes called Forestry Hose. This is a non-tapered iron pipe thread used in 1 inch wildland hose. Must use an adapter between NPSH and NH, threads are not compatible.
ODF	Oregon Department of Forestry
PSI	Pounds of Pressure
SAE	Society of Automotive Engineers. US standards for national fine and coarse threads

WHERE EQUIPMENT CAN BE PURCHASED

Local Companies

Coastal Farm Store
Wilco Farm Store
HPS Plumbing
National Fire Fighter Corp. – Springfield, OR
Mallory Fire Equipment – Longview, WA
Waterax (sold by LN Curtis) – Kent, WA

Internet Based Stores

Honda Power Equipment
Water Pumps Direct
Elkhart Valves
Polypro of America
Scotty Fire Fighters
Darley Fire Equipment
Fire Hose Direct
Norwesco for Valves and Plastic Non-baffled Tanks

DON'S RANDOM THOUGHTS

How much money is budgeted for something that might only receive infrequent use or can you build it so it is dual purpose?

What is the GVW rating for the vehicle in use? Is it mounted on a UTV, pickup, trailer, or on a tractor 3 point? Remember that 100 gallons of water weight 830 pounds, not counting the tank.

Can you reach all corners and elevation gain of your property with a pickup, side by side or ATV? If not, then consider a pump that delivers enough pressure to reach the corners and additional fire hose.

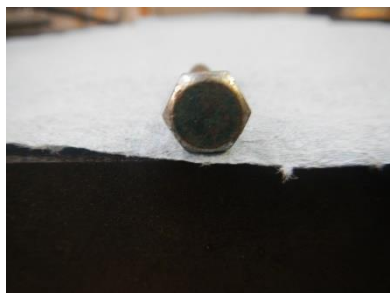
Are you going to draft with the pump in case more water is needed, or fill from your well?

If you are going to draft, then always install an inline strainer at the tank.



If you are using PVC pipe, check the maximum Pump pressure related to burst pressure on the PVC pipe.

I use grade 8 bolts in all critical areas and grade 5 bolts in all other areas of assembly.



Plain headed SAE grade 2 bolt. I do not use these in any part of my construction.



Three strike headed SAE grade 5 bolt. I use this grade of bolt for all general construction.



Six strike headed SAE grade 8 bolt. I use this grade of bolt for critical areas of assembly such as bolting the water tank in place. The lettering is from the manufacturer and has no bearing on strength, diameter, or thread size of the bolt.



Metric bolt with 8.8 grade markings, similar to grade 5 SAE bolt. The numbers are NOT the size, pitch, or diameter in metric, they only indicate the strength rating of the bolt.



Metric bolt with a 10.9 grade marking, similar to grade 8 SAE bolt. The numbers are NOT the size, pitch, or diameter in metric, they only indicate the strength rating of the bolt.



Nylock or Elastic stop nut, available in SAE and metric. These have a nylon insert that will hold the nut from vibrating loose. I use these in place of lock washers in high vibration areas such as the pump mounting bolts.

Also, there is a Metric bolt with the numbers 12.9 grade stamped on head of the bolt. This is a higher tensile strength than SAE grade 8. No picture.

I use Cold rolled steel for most of my metal construction projects instead of Hot rolled steel. The cost is more upfront, but the preparation time for welding is shortened. If you have ever wondered why your welds look like crap at times, it may very well be the mill scale on Hot rolled steel.

If you have read this far, congratulations. But I have a quiz for everyone:

Why are helicopter dip buckets listed in odd gallonage?
Such as 72-gallons, 144-gallons, or 216-gallons.

Answer: Helicopter buckets are manufactured in Canada and are listed per litre of capacity. When converted from Litre to US Gallons, the conversion ends up in odd US gallons.

A short Bio about Don Sohler's experience

During my 37-year career with the ODF fire program, a large portion of my time was spent repairing fire equipment and constructing new initial attack engines with tank sizes from 150 to 1000 gallons. The fire engines were built from scratch without plans, and designed and built according to the budget and needs at the time.

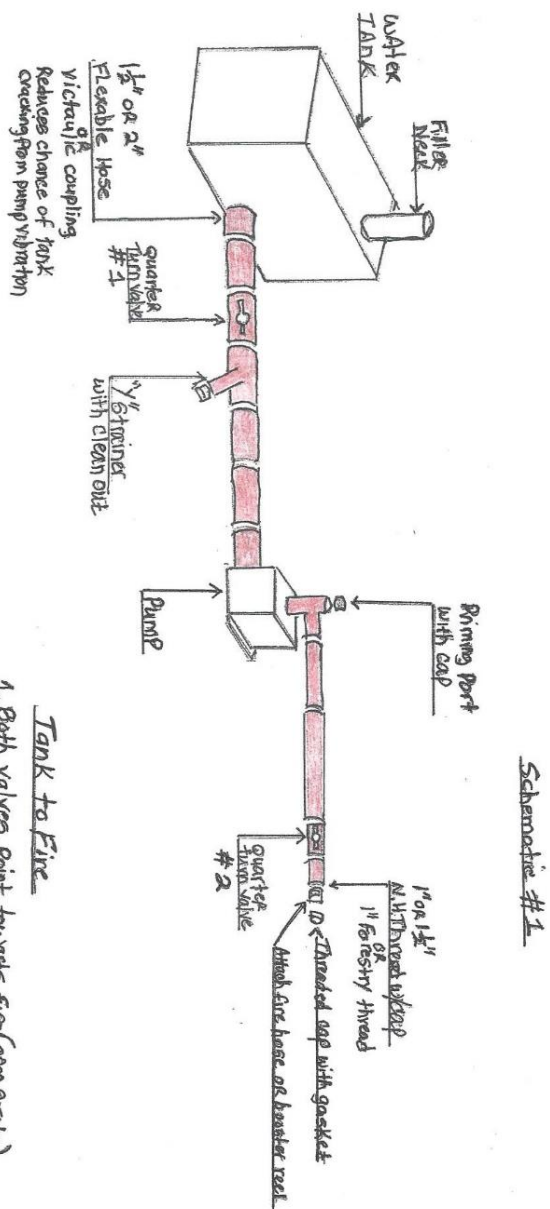
I was also called on each summer to fly with a contracted fixed wing pilot and plane and served as the flying watchman. That led me to managing commercial and National Guard Black Hawk and Chinook helicopters on large complex fires throughout the western states.

The last 15 years of my career were spent assisting rural volunteer fire departments to procure used equipment that could be converted to fire use. Many of the rural fire department vehicles that were converted to fire use remind me of the Small Woodlands members UTV fire units shown in this manual.

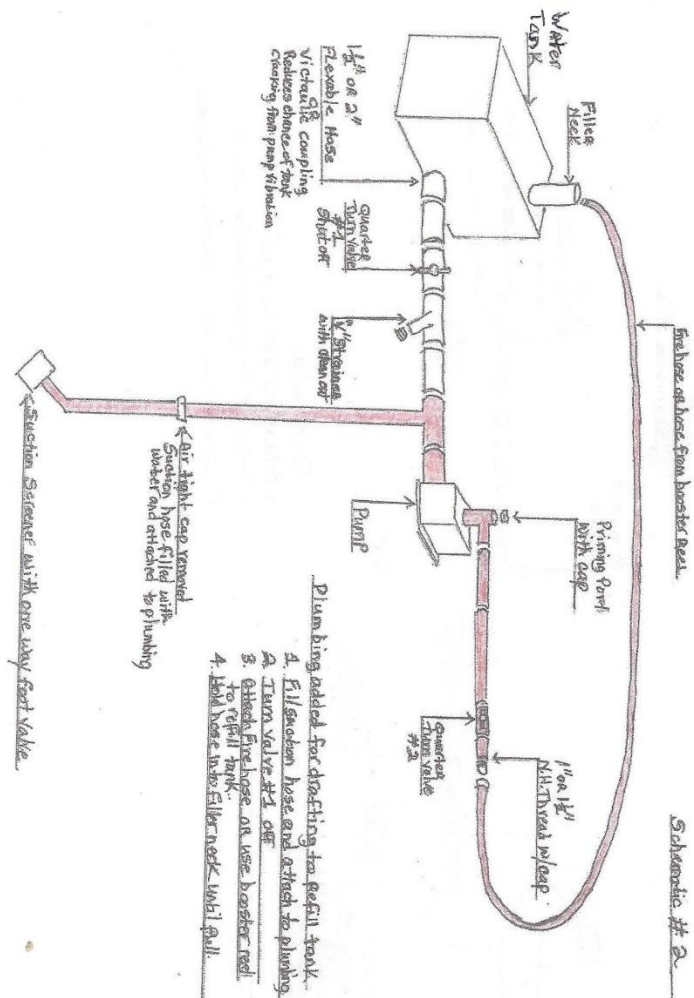
The next four pages show four schematic drawings of different ways to build the fire apparatus.

Remember this is for initial attack of a small fire and not extended attack. Leave the extended attack and mop up to the ODF and fire department crews.

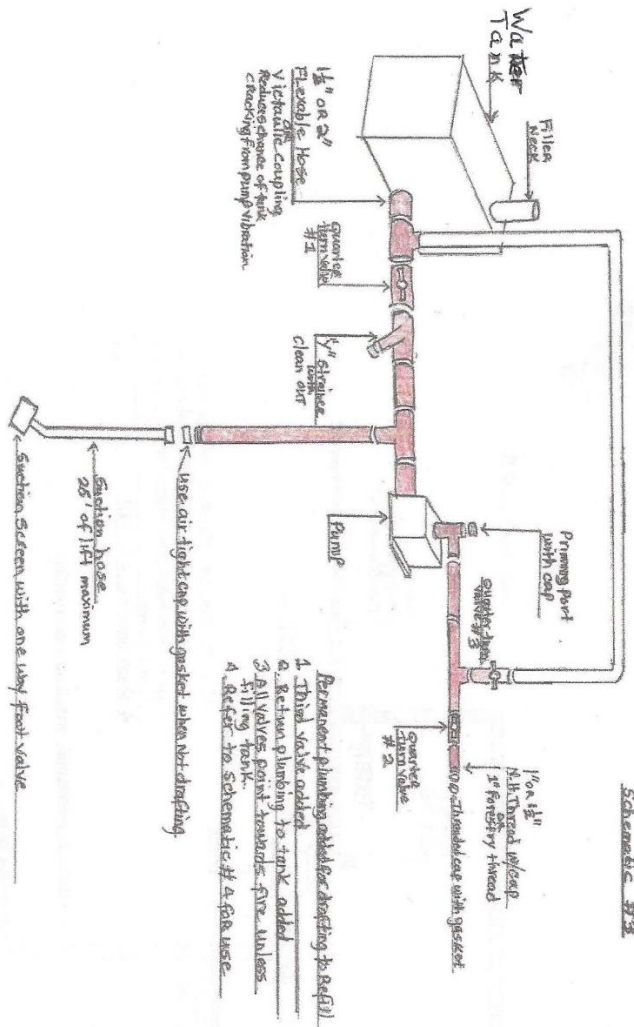
Schematic #1:
A simple design showing tank and pump direct to fire.
This is a two-valve system.



Schematic #2: Drafting (suction hose) and plumbing added. Tank is filled from creek or pond by the operator holding a section of fire hose or hardline from hose reel into filler neck of the tank.
Two-valve system with drafting capabilities.



Schematic #3: Same as schematic #2 with third value and return plumbing added.



Schematic #4: With return plumbing and a third valve added. An operator can fill tank from pond or creek without holding hose into filler neck of tank. 3-valve system with return plumbing in use.

