Used Oil Burners

I'm interested in a used oil burner. Where do I start?

1. **Read** through the information here to learn more about used oil burners.

2. **Call any of the used oil burner distributors** listed below. They can help you decide what burner might be best for your community. They can answer many of your questions. The more information you can tell them, the better.

   Here is what you can **tell** the distributor:

   - About how big the building is that you want to heat,
   - About how much oil your community produces,
   - What types of oil are generated in your community, and
   - What kind of electrical power will be available in the building.

   Here is what you can **ask** the distributor:

   - What kind of maintenance required?
   - How much does it cost to operate and maintain?
   - Will we run out of used oil if we heat the building all the time?
   - How much does the burner cost and what does that include?
   - What if I order it and it doesn't work?

   It may also be helpful to check out their websites for further information about their burners.

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3. **Call Ted Jacobson, Alaska Solid Waste Tribal Liaison at EPA**. If you still have questions about used oil burners, give Ted Jacobson a call at 865-7363 to ask any further questions.

What is a used oil burner?

Used oil burners **convert your community's used oil into energy to heat buildings**. There are many different brands of used oil burners and each brand is a little different from the others.

Basic parts to a used oil burner

Fuel tank - Most brands have a bottom tank used to store the used oil. Some companies sell burners without the tank, so you can use your own (if it is suitable).

Stand – Depending on the brand, used oil burners can be suspended from the ceiling or mounted on a stand (with or without a tank).

Air compressor – Used oil burners may or may not have built-in air compressors. Used oil burners require an air source to operate, so if you don't have an air compressor, you must buy a burner with an on-board or built-in compressor.

Chimney Stack – A chimney stack vents exhaust to the outside of the building. Most companies will sell chimney stack kits with their used oil burners.




Examples of different brands of used oil burners

Where can I purchase a used oil burner?

Distributor, Location	Type of used oil burner they sell	Phone	Website
NuERA, Anchorage, AK	Black Gold	1 (800) 347-9575	www.nueraheat.com
Northwest Industry Equipment, Washington	Shenandoah	1 (253) 872-6060	www.usedoilheaters.com www.oilburners.com
Lanair, Wisconsin	Lanair	1 (800) 562-5504	www.lanair.com

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MRO Sales, Anchorage, AK	Reznor	907-248-8808	www.reznorheaters.com www.mrosalesinc.com
Nenana Heating, Nenana, AK	Cleanburn	907-832-5445 Email: nhsi@alaska.net	www.cleanburn.com fax: 907-832-5491

The vendors are listed here as a directory to assist people in identifying and locating the resources they need to apply to their individual, company, or community situations. Zender Env neither endorses nor underwrites any of the vendors listed here and is not in any financial relationship with any vendor listed here. Zender Env does not portray this vendor list as a final or complete list. Zender Env invites vendors whose products and/or services fit the category of Solid Waste Management to contact Simone Sebalo ssebalo@zendergroup.org about inclusion on the vendor resource web list.

How much do used oil burners cost?

Used oil burners typically cost **$6,500-$12,000** (including shipping), depending on your location and the brand you purchase.

Which brand should I choose?

Used-oil burners don't necessarily differ much in quality or how well they perform. The brand you buy depends on many considerations:

- If there is already a used oil burner in your community, talk to the operators to see how they like their brand. If they recommend their used oil burner, it makes sense to **get the same brand** so you can share knowledge and tools for installation, operation, and maintenance.
- Calling the different distributors will help you learn about specific plusses and minuses to their type of burner.
- You can go to our database to find other communities that have used oil burners. You can give them a call and see what they like or don't like about their brand.
- What is the price tag?
- What is the shipping price? This might depend both on the distributor and the barge or airline.

- How soon can the burner be shipped? Some distributors might not have the model you want in stock. They will need to order it.

- How did you get along with the distributor when you talked with them? This might make a difference if something goes wrong with the burner. Feeling comfortable to ask all the questions you want is important in getting that burner to run right.

What size used oil burner do I need?

This will depend on:

- The size of the building you want to heat
- The amount of time you plan to use the burner for heating the building
- And the amount of used oil that is generated by your community.

The best way to determine the size of the used oil burner is to **contact any of the distributors listed in the table above** and talk to them about your specific situation.

The table below lists a few different-size burners, the amount of oil they use, and an estimate of the area they will heat:

Size of Used Oil Burner (BTU's/hour)*	Quantity of oil burned (gallons/hour)	Approximate heating area (square feet)
100,000	0.75	2,000
144,000	1	3,000
240,000	1.7	5,000
350,000	2.5	8,500
500,000	3.5	12,000

*Note: the higher this number, the more heat is produced.

To get a very rough idea of the size of the burner you need, figure out the full size of the building in cubic feet, and then multiply that by **4** to get the approximate BTU's/hour needed.

For example: Say your building is 50 feet wide, 60 feet long, and 12 feet high.

Multiply 50 x 60 x 12 = 36,000 cubic feet.
Then 36,000 cubic feet x 4 = 144,000.

So, 144,000 BTU/hr used oil burner is the approximate size you need.

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You can also use the table above to determine **the amount of oil you will use** for your size burner. For example, to use the 144,000 BTU/hour burner, look at the 2nd row of the table. To heat a building for **9** hours each day, **4** days each week, and for half the year (**26** weeks), you would use approximately:

1 gallon oil/hour X **9** hours X **4** days/week X **26** weeks/year
= **936 gallons of oil per year**

Keep in mind that there are other **things to consider when sizing** your used oil burner. For example, if the **doors in your building** are opened and closed several times a day, then you will lose a lot of heat. A larger burner may be needed.

Another factor is the amount and type of **insulation** your building has. A used oil burner distributor might ask if you know the 'R' rating of the insulation in the building. This is a number that indicates how good the insulation is. If you don't know, tell them the type of insulation you think you have (if any). Tell the used oil burner salesperson as much as you can about the building you want to heat so they choose the right equipment for your situation.

Can a used oil burner save my community money?

Yes! Depending on your situation and the way used oil is handled in your community, you could get payback on a used oil burner within 2 years of purchase! Recycling your used oil for heat can save your community money in several ways:

- You will need less new fuel for heating purposes.
- Disposal costs will be reduced or avoided.
- Cleanup and liability costs for improper disposal will be reduced or avoided.

It can cost an average of $5-10 per gallon to ship out oil. If your community produces and ships out 200 gallons of oil per year, you could save $1,000-$2,000 if you recycle your used oil instead.

Does my community produce enough oil to run a used oil burner?

If your community generates **500-1000 gallons of oil/year** or more, it will be worthwhile for you to purchase a used oil burner.

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What types of oil are acceptable to use in a used oil burner?

Manufacturers of used oil burners will let you know exactly what types of used oil that can (or can't) be used in their specific machines but, in general, these are the types of oils that are acceptable and unacceptable to use:

☺ **What you can use in a used oil burner:**

- ✓ Automotive crankcase and gear oil (from generators, cars, trucks, four-wheelers etc.)
- ✓ Transmission Fluids
- ✓ Hydraulic fluids
- ✓ Diesel fuel

☹ **What you CAN'T use in a used oil burner:**

- × Gasoline (Can cause a used oil burner to explode!)
- × Anti-Freeze
- × Solvents
- × Water
- × Parts Cleaner
- × Insecticide
- × Paints
- × Varnishes
- × Thinners
- × Vegetable or animal fat
- × Used oil that is mixed with any of the items listed above

Installing a used oil burner

Most companies that sell used oil burners will send you an installation demonstration **video** and/or extensive **installation manual**. The videos and manuals will walk you through the installation process step by step.

Here are some pictures from an installation in southwest Alaska.

Starting the installation of a used oil burner at Goodnews Bay (Dennis Lundine, DEC)

Setting up the stand

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Installing the heater unit on top of the stand

Installation complete! Note the chimney stack

What will I need to install my burner?

There are a few items/pieces of equipment that you should have on hand:

- Bobcat, forklift, or front-end loader for lifting used oil burner in place
- Ladders for getting on the roof and installing chimney stack
- Powered screwdrivers (very handy!)
- An assortment of metal screws

Heavy equipment being used to lift heater unit onto the used oil burner

What about electrical hookup?

A licensed electrician will also be needed to make the final connection to power supply.

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Electrical Power Requirements by Dennis Lundine, Oil Burner Expert (formerly of DEC):

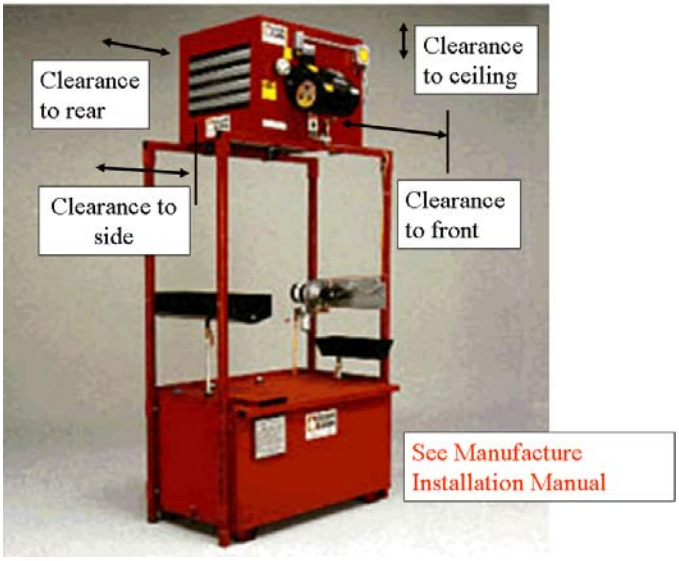
" Bringing power to a used oil burner requires reviewing the voltage and amps required for the particular size burner to be used. On a wall near the burner, a lockout style wall switch must be installed for the safety of the personnel when working on the burner. Rigid conduit should be used from the main power box to the lock out switch.

Flexible conduit can be used from the lock out switch to the burner's power bus. Make the power supply the last thing to connect, this allows the sense of safety while wiring the remote fuel pump from the tank to the burner. Flexible conduit can also be used from the remote pump to the main power bus."

Where should the used oil burner be placed in the building?

Placing the used oil burner is an important decision and requires some thought. For example:

- The burner should be located away from heat-loss areas, such as doors.
- It is recommended that the burner be installed above people's heads, to avoid air blasting into people's faces.
- The burner must be installed a minimum distance from the walls and ceiling (each burner has its own specific clearance requirements).



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Placement of used oil burners in a building by Dennis Lundine, Oil Burner Expert:

"Take the time to plan the location where you would like to place the burner. Remember there are a few factors to consider other than just a clear spot in the building. Plan to **install the burner away from the major heat loss areas** such as bay doors. Place the burner in the back of a shop away from the doors to help control heat loss and recovery. Another reason, which is often overlooked, is the fact that doors create **drafts** that can affect the fire in the chamber of burners. This causes pre-mature shut downs due to flash backs of the flame. If the burner is to be installed where bay doors are going up and down such as an auto oil change center, then it is advisable to install a draft booster. The booster or draft inducer can be purchased from an HVAC supplier or contractor near you."

"**It is recommended that the burner be up above** normal peoples head heights. Most burners stand 8' off the floor. This avoids the air throw from hitting one in the face while trying to work. You may also suspend the burners from the ceiling if desired. Follow the directions in the installation manual. "

"**Plan on having access to each side of the burner.** The potash created from burning used oil will need to be cleaned from the burner every 350 to 400 hours depending on the cleanliness of the oil so this access is important. Each burner size has a required minimum clearance on all sides. Review the installation manuals to determine these measurements.

"**Look at the ceilings and walls**; you do have to **run a stack** out either one of these. The stack should be galvanized inside and stainless steel outside the building. When going through the walls or ceiling, this will require double wall stainless steel plus some type of shield to penetrate the ceiling or wall. Go outside and look where the stack would exit the building out the roof or wall. Are there any obstructions making it complicated?"

"**Very Important!** Do not attempt to plan a stack near any power supply lines **electricity kills**!"

Where should the stack be located?

The actual location of the stack must be decided prior to setting up the burner, tank, and stand. It is very important to go outside and look where the stack would exit the building -- out the roof or wall. ***Do not attempt to plan a stack near any power supply lines - electricity kills!***

Feeding the stack from the inside of the building to the outside

Stack coming out of the building

Extending the stack so it vents above the roof

Another example of a stack being fed to the outside of the building from another used oil burner

Stack location and type by Dennis Lundine, Oil Burner Expert:

"The stack sizes of are 8" for the 140,000, 235,000, and 350,000 BTU burners. The 500,000 BTU burner has a 10" stack. A minimum of 24 gauge-galvanized pipe is used on 8" or 9" stacks with 22 gauge for 10" or 12". Galvanized pipe can be used inside the building. The portion of the vent system passing through walls, attics, and roofs needs to be of a **double or triple wall design** that is approved to Standard UL 641. Horizontal lengths and slopes of the galvanized pipe may be used per the following table."

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Stack Diameter	Used Oil Burner Model Size and Vertical Length of Stack Needed	Maximum Horizontal Length of Stack
8"	**140,000** 8' or more of vertical pipe	Equal to or less than the vertical height
8"	**235,000** 8' of vertical pipe	4 feet or less
8"	**235,000** 10' of vertical pipe	Equal to or less than the vertical height

"When installing the stack, be sure to **support the weight** using plumbers' tape or some other non-combustible strapping material. A barometric **Draft Regulator must be used** which has the same diameter as the vent pipe, and it should be located close to the burner. DO NOT install a manual damper or any other device that will obstruct the free flow of the flue gases. The **vent must terminate at least 3 ft above** the highest point of the exit and at least 2 ft. higher than any portion of a building or obstruction within 10 ft of the chimney. If the stack is more that 10' from the highest peak, then a 3' to 4' height from the roof is acceptable."

Remember, it is important not to exit the building near power lines located on the outside walls or roof.

What about maintenance of a used oil burner?

All used oil burners require general maintenance. Maintenance instructions for the specific burner you purchase will come with the burner as part of the manual or as a separate document.

Most used oil burners require thorough **annual cleanings**. Some companies can perform this annual cleaning for you have to pack up the burner-- the top heater part-- and send it to the company. You have to pay for shipping. They perform the full cleaning and then send it back. Depending on the type of burner and company, this might cost about $100-$200 (excluding shipping).

Watch what you put in your burner!

One of the most valuable pieces of advice is: **to make sure the used oil is clean and free of debris, water, glycol, solvents, gasoline, or avgas.** If you don't watch what you're putting into the burner, the most common problem you will encounter will be plugged strainers, filters, and injectors' nozzles. These problems are big headaches! Think of your used oil burner as a car, snowmobile or boat. You wouldn't put dirty fuel in any of these! Container management will help you keep used oil clean during storage.

Strainers on your used oil burner tank are also extremely helpful to filter out debris that might be in your oil.

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Routine Maintenance

Cleaning out the ash from each end of the heater at regular maintenance intervals is important to keep your burner running efficiently. Having a safe ladder or platform near your burner is helpful for cleaning. You can tell when you need to clean out the ash by recording what the hour meter on the pump reads each time. A rake and grounded shop vacuum can be used to remove the ash from the heat exchanger. Your manual will have further information about cleaning the ash that is specific to your type of burner. Caution: Always **protect yourself** with safety glasses, rubber gloves, and respirators when cleaning any used oil burners. (See our safety gear webpage: http://www.zendergroup.org/docs/Safety_gear.pdf).

Bi-annual and annual inspections should include cleaning the primary oil burner cylinder along with replacing the nozzle, electrodes and small thermo discs located on the primary burner and on the end of the assembly. After starting your burner each time after maintenance, it's a good idea to check the draft over the flame to maintain the correct flow of flue gases.

Maintenance Schedule

The following maintenance schedule is given as a recommendation only and should be adjusted to meet your community's needs and condition of the used oil burner. The items should be checked either daily, weekly, monthly, or yearly as needed, depending on the activity of your burner:

Activity	Daily	Weekly	Monthly	Yearly
Burner Inspection				X
Electrical connection and wires should be checked inspected annually for loose connections, bad wires, burned or wires that appear to be cracking from burner heat generated				X
Nozzle and electrode tip cleaning and adjustment *				X
Checking for Correct Draft *			X	X
Cleaning tank strainers *				X
Cleaning in line Strainers			X	X
Cleaning check valves *				X
Cleaning/vacuuming burner boxes				X
Nozzle Cleaning and Adjustment *				X
Vacuum heat exchanger or burner box area				X
Cleaning preheater or heating blocks-this should be done only by factory trained individuals *				X
Heating Stack should be cleaned with a stack brush *				X
Collection tanks and containers for leaks and spills	X			
Tank drain valves should be closed and locked.	X			
All used oil containers and drums lids and bungs should be tight sealed	X			
Containers and drums located outside the facility that are subjected to rain and snow should be covered with a tarp, board or shelter	X			
Drain water from collection and holding tanks			X	X

(* As needed)

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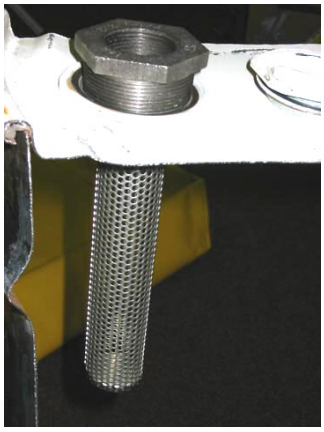
Operating a used oil burner

A detailed guide/manual or video will come with the used oil burner you purchase and give you specific instructions about operating your used oil burner. You also should always be able to **call** the company you purchased the burner from to ask any questions.

The #1 most important operating rule is **to make sure the used oil you are putting in the burner is clean and free of debris, water, glycol, solvents, gasoline, or avgas**. Gasoline **is very dangerous** to burn in a used oil burner. Also, used oil burners won't function properly if antifreeze or water is put in the tanks. Even though small amounts of antifreeze may burn, it will cause a glass liner to build up in the burner box that is very difficult to get out. And one inch of glass buildup or ash inside of the burner box will reduce the heat output of the used oil burner by 50% .

Strainers

Strainers can be used on your used oil burner tank or on storage drums to filter out any grit, rags, leaves, cigarette butts, etc. that may be in your used oil. They fit right into bungholes of 55 gallon drums or you can get them sized specifically to fit into tanks. You then pour the oil through the strainers.



Example of a strainer in a standard 55 gallon drum bunghole. (Note: the drum used in this picture is cut in half for educational purposes to show how to use the strainers.

Strainers can be purchased for under **$20**. You can check out these websites to view different types of strainers and filters:
http://www.thecarycompany.com/Main.html
http://www.globalindustrial.com/
http://www.cdf1.com/drums.php
www.flowezyfilters.com

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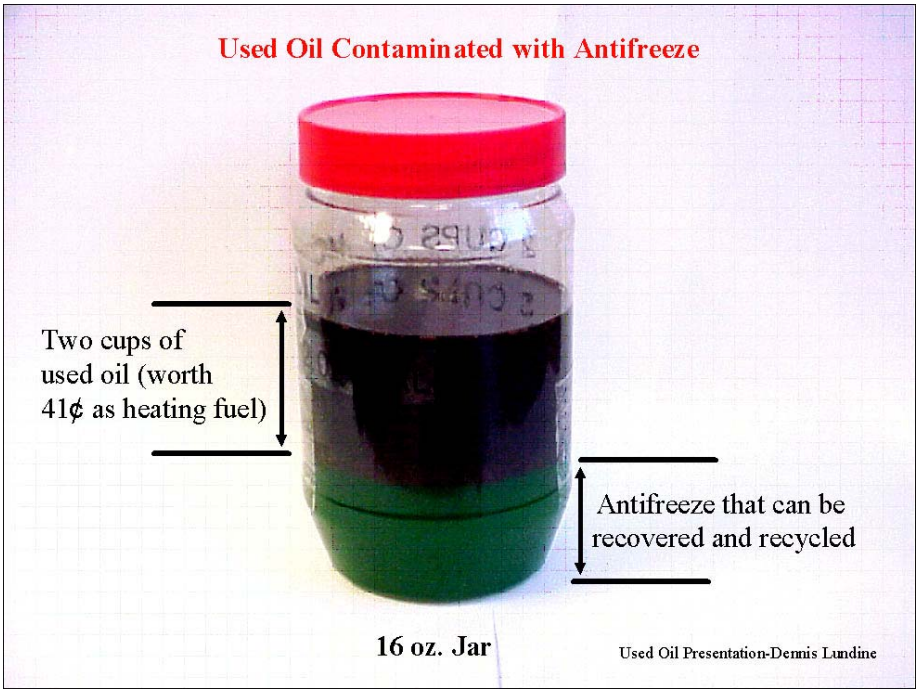
Settling Tank

It is a good idea to have a settling tank to put your used oil in BEFORE it goes into your used oil burner tank. A settling tank can be simply a drum sitting on its side on a palette with a spout on the bottom. The purpose of a settling tank is to separate any antifreeze or water that may be mixed in with your oil. This is an example of what happens when oil and antifreeze are in the same container:



Because antifreeze (and water) is denser than oil, it settles to the bottom of the container and the oil sits on top. With a drum, you install a drain valve at the bottom. You can open the valve and drain out the antifreeze (or water) into a bucket or oil pan until you no longer see antifreeze (or water) coming out. Now you have pure used oil ready to put into your used oil burner!
You can purchase valves, strainers and filters at the following places:

Anchorage Tank and Welding
2700 Porcupine Dr
Anchorage
Phone: 272 3543
Web:www.anchoragetank.com

Alaska Hydraulics
166 E. Potter Drive
Anchorage, AK 99518
Web: www.alaskahydraulics.com
Phone: 562 2217

Safety precautions

Used oil has contaminants that are **hazardous to your health.** When working with used oil, avoid prolonged or repeated skin contact with the oil. It's a good idea to **thoroughly wash oil exposed areas with soap and water**. Also, it is a good idea to minimize smelling the oil up-close because of

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the fumes. When handling used oil, it is a good idea to wear rubber gloves and Tyvek coveralls to protect yourself from being splashed.

When cleaning used oil burners, it is advisable to always protect yourself with:,

Safety glasses

Rubber gloves

Respirator

It is especially **important to wear a respirator when cleaning out the burner.** You should also have spill cleanup materials available in the event of a spill, such as absorbent pads. Peat moss and cat litter can also be used as a cheaper alternative to absorb spills. See our safety gear webpage (http://www.zendergroup.org/docs/Safety_gear.pdf).

Who uses used oil burners in Alaska?

There are many communities in Alaska that are running used oil burners to heat various types of buildings. Below is a list of just some communities that have oil burners.

Feel free to give these communities a call to find out about their used oil burners and what they like or dislike about their brand. They may be able to give you good tips on finding the best and least expensive burner!

Community Name	Brand of Used Oil Burner	Size of Used Oil Burner (BTU's/hr)	Contact information
Umkumiut TC Purchased 2012	Black Gold	EL140H-CS, Model 140	Dustin Slats, 907-647-6145
Afognak Native Corp., Purchased 2012	Black Gold	EL140H-CS, Model 140	Gerry Engel, 907-770-5568 Kodiak
Nuiqsut Village, Purchased 2011	Black Gold	EL200H, EnergyLogic Model 200	Gordon Brown, 480-3010
Thorne Bay City, Purchased 2011	Black Gold	EL200H-CS, EnegyLogic Model 200	828-3380
Marshall Village Council, Purchased 2011	Black Gold	EL200H-CS, EnergyLogic Model 200	Jeremy Woods, 679-6306
Port Lions Village, Purchased 2011	Black Gold	EL200H-CS, EnergyLogic Model 200	454-2234
Tanacross Village,	Black Gold	EL200H-CS, EnergyLogic	883-5024

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Purchased 2011		Model 200	
Aluet Entp./Adak, Purchased 2011	Black Gold	EL340H-CS, EnergyLogic Model 340	Mike Baker, 277-7525
Holly Cross Village, Purchased 2011	Black Gold	EL200H-CS, EnergyLogic Model 200	Elsie, 476-7124
Chevak Village, Purchased 2011	Black Gold	EL200H-CS, EnergyLogic Model 200	Cynthia Paniyak, 858-7827
Larsen Bay	Reznor	160,000	Alan Panmerinoff 847-2211 (used to heat their garage)
Goodnews Bay	Black Gold	One size fits all	Alice Julius 967 8034
City of Old Harbor	Reznor	160,000	Jim Nestic, Mayor 286-2203 (used heat their city shop)
Ft Yukon	Shenandoah Purchased from Craig Taylor	235,000	Vicky Thomas 662 2581 (used to heat their materials exchange thrift store - when it is cold)
Kodiak Landfill	Reznor	160,000	James Sog 486.8060
City of Galena	Black gold	One size fits all	656-1301
City of Kasaan	Black gold	One size fits all	542-2212
Kokhanok Village Council	Black gold	One size fits all	Roy Andrew 282 2202
City of Kotzebue	Black gold	One size fits all	Ernest Hyatt 442-3470 Ext. 117
City of Pilot Point	Black gold	One size fits all	797-2200
City of Seldovia	Black gold	One size fits all	Ken Weaver, Mayor 234-7643
Ouzinkie	Reznor	160,000	Tom Quick 680-2209
City of Akutan	Black Gold	One size fits all	274-7555,
Aniak-City Shop	Clean burn	180,000	Charlie Lang 675-4481
Aniak Tribal Council	Black Gold	One size fits all	Jason Ward 675 4349
Chevak, Water and Sewer	Black Gold	One size fits all	Cynthia Paniyak 858 7827
Chitna FD, Village Council	Black Gold	One size fits all	823-2215
City of Barrow	Black Gold	One size fits all	Jim Barten 561-6105
Selawik	Black Gold	One size fits all	Raven Sheldon 484 2006

Storing and Collecting used oil

See our webpage for storing used oil and other hazardous waste.
http://www.zendergroup.org/reuse_shed.html

If used oil is collected from individuals in the community it is important to visually inspect the oil before you put it into your used oil burner. Remember, adding anything but the acceptable types

of waste oils to your burner could possibly destroy it or cause it not to run properly. As a reminder, here is a list of items that you DON"T want to put in your burner:

☹ What you **CAN'T** use in a used oil burner:

- × Gasoline (Can cause a used oil burner to explode!)
- × Anti-Freeze
- × Solvents
- × Water
- × Parts Cleaner
- × Insecticide
- × Paints
- × Varnishes
- × Thinners
- × Vegetable or animal fat
- × Used oil that is mixed with any of the items listed above

Common oil contaminants that some people bring in their oil containers include water and paint chips. If the oil is any color besides black, it needs to be separated and cleaned. If the oil is not black and it doesn't separate, don't use it.

It's always a good idea to keep a **log** of who brought oil, and how much, so you know later if something goes wrong.

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