

Oil Skimmer Facts

**Solving
Oil Removal
Problems
for Over
Thirty Years**

Your Guide to Oil-Free Solutions

The relationship between oil and water in a mixture is well-known and governed by two physical properties:

- **Specific Gravity:** Most hydrocarbons have a lower specific gravity than water. Without agitation, oil separates from the water and floats to the surface. These oils are known as LNAPL's, Light Non-Aqueous Phase Liquid. Oils (and other compounds) that sink in water have a higher specific gravity and are known as DNAPL's, Dense Non-Aqueous Phase Liquid.
- **Surface Tension and Affinity:** Normally, oil bonds more tightly to itself and other materials than to water. This affinity, and differences in surface tension between oil and water, cause oils to adhere to a skimming medium.

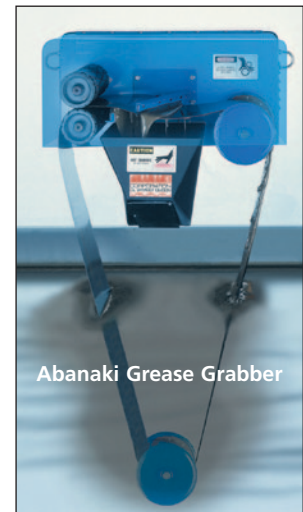
Oil Skimming

Although designs vary, all oil skimmers rely on specific gravity, surface tension and a moving medium to remove floating oil from a fluid's surface.

Floating oil and grease cling to skimming media more readily than water, and water has little affinity for the media. This allows skimming media in the shape of a belt, disk, drum, etc. to pass through a fluid surface to pick up floating oil and grease with very little water. This oily material is subsequently removed from the media with wiper blades or pinch rollers.

Oil skimmers are simple, dependable and effective tools for removing oil, grease and other hydrocarbons from water and coolants. Often, an oil skimmer by itself can achieve the desired level of water purity. In more demanding situations, oil skimming is a cost-effective means of removing most of the oil before using more complicated and costly treatments such as coalescers, membrane filters and chemical processes.

Grease skimming involves higher viscosity hydrocarbons. Oil skimmers must be equipped with heaters powerful enough to keep grease fluid for discharge. The patented Abanaki Grease Grabber® is fitted with heating elements to handle these applications.



Abanaki Grease Grabber

If the floating grease has formed into solid clumps or mats, a spray bar, aerator or mechanical apparatus can be used to break up grease mats and facilitate removal.

Typical Applications for Industrial Oil Skimmers

Wastewater Sumps

Most manufacturing or processing facilities have water systems where waste oil collects in a central tank or sump. Skimming the floating oils with little water content can reduce the cost of disposal and lower the contingent liabilities of wastewater discharge.



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Coolants and Cutting Fluids

When machine coolants become contaminated with tramp oils, four things usually occur: 1.) coolant life is reduced; 2.) quality of machined parts is reduced; 3.) in many cases, a smoke will begin to appear in the shop, causing irritation to the workers on the job; and 4.) the fluid takes on a "rotten egg" odor. Oil skimmers that remove tramp oils solve these problems and typically pay for themselves within a few months.

Heat Treating

Quench oils that must be removed from heat treated parts can be captured for re-use or disposal. The results are lower quench oil costs, prolonged wash water life and lower disposal costs.

Parts Washers

Floating oils re-contaminate parts as they are removed from a wash tank. Oil skimmers can remove this oil. The benefits of using an oil skimmer are oil-free parts and extended fluid life.

Food Processing Facilities

Removal of vegetable oils, greases, and animal fats from a plant's wastewater stream reduces the costs of processing and disposal.

Steel Mills/Scale Pits

Most steel mills have scale pits in which grease and heavy oils accumulate. In order to avoid fines from the government and expensive sand bed filters, steel mills must limit the amount of grease in wastewater discharged into the environment. Reclaimed grease and oil can be re-used or used as furnace fuel, avoiding sucker truck disposal costs.

Parking Lots, Garages and Service Facilities

Waste oil from leaks, spills and other sources must be retrieved from sumps before water can be discharged to storm or sanitary sewers.

Outdoor Ponds, Lakes, Basins, etc.

Where floating oils are present, oil skimmers provide inexpensive and effective removal, solving a serious environmental problem.

Recovery/Monitoring Wells

Removing oil, fuel and other hydrocarbon liquid from wells can be more cost-effective using a belt skimmer instead of a down well pump. Oil skimmers don't have nearly the maintenance issues and can reach depths of 100 feet or more, removing product despite fluctuating water tables. Oil skimmers can handle very thick fluids effortlessly and some (like the Abanaki PetroXtractor®) can remove sinking DNAPL's such as coal tar and creosote from water.

Choosing an Appropriate Oil Skimmer

There are several types of industrial oil skimmers. Choosing one best suited for your application will maximize oil removal while minimizing capital outlay and oil skimmer operating costs. First, define the application in terms of the following characteristics:

Operating Conditions

All oil skimmers have a moving medium, and possibly other parts, immersed in the liquid. The performance and life of the pick-up medium, wiper blades, pulleys, etc. are affected by

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different conditions. These conditions include temperatures in and out of the liquid, pH of the solution, and the presence of solvents or other reactive chemicals.

- **Hazardous Materials:** Applications involving flammable materials or explosive vapors require the use of explosion proof or air driven motors and controls.
- **Temperature/Viscosity:** All oil skimmers require floating oil to be in a liquid, free-flowing state. If the oil congeals or solidifies at ambient temperatures, the tank and/or oil skimmer will require heaters to maintain fluid flow. This is especially true at temperatures low enough to freeze water. A heater option is a must if an oil skimmer is to be used outdoors in freezing temperatures.

Removal Capacity

- **Rating:** Oil skimmers usually have an oil removal rate expressed in gallons per hour. The rate varies with oil viscosity, so Abanaki rates skimmers using SAE 30 weight motor oil at 65°F (18°C). When specifying removal capacity, it is better to err on the high side to allow for peaks in the oil influx.
- **Water Content:** All oil skimmers pick up some water with the oil they remove. Some designs, particularly suction skimmers, pick up more water than others. High water content increases oil recycling and disposal costs. Generally, the ratio of water-to-oil decreases with thicker films of floating oil and slower moving pick-up media. An Oil Concentrator® or decanter installed at the oil skimmer discharge port provides secondary oil/water separation that can reduce water content to nearly zero.
- **Residual Oil:** An oil skimmer continues to remove oils as long as they are present. Depending on oil influx rate and the oil skimmer's removal rate, residual oil in the water may be as low as a few parts per million. When residual oil reaches this level and further reduction is required, it may be more practical to use a secondary removal method following skimming, such as membrane filtration.
- **Portability:** Oil skimmer portability is a plus in some applications. For example, in plants, mobile equipment service shops, and at remediation sites, a portable oil skimmer can sometimes service multiple machines, sumps, or wells.

Tank or Sump Characteristics

The location, shape, and capacity of a tank or water impoundment are major factors in choosing the right oil skimmer. Also consider fluctuations in water level, turbulence and possible emulsions. Although oil skimmers do not cause emulsions, they can have trouble removing certain types.

- **Size/Design:** Oil and water can emulsify when subjected to turbulence and other mechanical agitation. Avoid this by having water return to the tank below the liquid surface at as low a velocity as practical. Make sure your tank or sump provides quiet areas, weirs, and sufficient volume to allow adequate time for oil/water separation.
- **Shape:** Tanks without nooks and crannies for oil to accumulate in are best. If you have an irregular shape, put the oil skimmer where the largest



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Removal Capacity	INDUSTRIAL OIL SKIMMERS					SPECIAL PURPOSE SKIMMERS		
	Small Applications	Medium Applications		Large Applications		Monitoring Wells up to 10"	Large Pits	Harsh Environments
	Light Duty	Medium Duty	Light Heavy Duty	Medium Heavy Duty	Heavy Heavy Duty	Groundwater Remediation	Heavy Oil or Grease	316 SS Construction
Reach of Skimmer	Up to 2'	Up to 5'	Up to 100'	Up to 100'	Up to 100'	Up to 100'	Up to 100'	N/A
1 GPH	■	■	■	■	■	■	■	■
2 GPH	■	■	■	■	■	■	■	■
3 GPH		■	■	■	■	■	■	■
6 GPH		■	■	■	■	■	■	■
12 GPH		■	■	■	■	■	■	■
16 GPH			■	■	■		■	■
20 GPH			■	■	■		■	
40 GPH				■	■		■	
80 GPH					■		■	
120 GPH					■		■	
160 GPH					■		■	
200 GPH					■			

Removal rates based on SAE 30 motor oil.

Grease Grabber removal based on Plexelene 750™.

Size of application must be taken into consideration for optimal recovery rates.

■ Appropriate sizing.

■ Capacity well above desired level.

amount of oil accumulates. Consider a means of directing oil towards the oil skimmer such as a floating boom or baffle plate.

- **Location/Installation:** The physical location and characteristics of the tank and collection container are important. Does skimmed oil need to be pumped from the oil skimmer to the container? Will oil skimmer access for periodic maintenance be a problem? How much mounting space is available? Are tank or container modifications required? Cheap oil skimming systems quickly lose appeal when costs for additional components, increased maintenance and expensive tank modifications are involved.

Different Types of Oil Skimmers

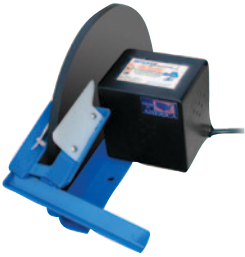
For industrial oil skimming, there are six basic designs commonly used:

- **Belt Oil Skimmers:** Belt-type oil skimmers use an endless belt of corrosion resistant steel or synthetic medium, which is lowered into the tank or vessel to be skimmed. The belt passes through resilient wiper blades where the oil is removed from both sides of the medium.
- **Disk Oil Skimmers:** These oil skimmers rotate a disk shaped medium through the liquid. Oil is wiped off and discharged into a collection container in a manner similar to belt oil skimmers. It is important to consider reach, the portion of the disk that actually gets immersed, when looking at a disk oil skimmer. Less disk in the fluid means less oil removed. Obviously, fluctuating fluids can be a real problem for disk oil skimmers.
- **Drum/Barrel Styles:** These are similar to the disk type, but use a rotating drum shaped medium. Compared to disk types, they are usually more rugged and have higher removal capacity. Depending on the design, these units can also be rendered ineffective by fluctuating fluid levels. Also, water pickup with this type of oil skimmer can be high.



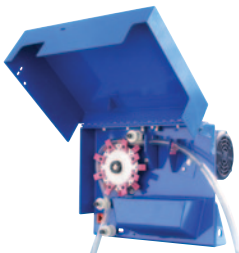
Abanaki Mighty Mini SST with integrated timer

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■ **Mop Oil Skimmers:** These oil skimmers use an endless medium shaped like a rope and having mop-like tendrils that pick up the oil. As the medium leaves the liquid and enters the drive unit, it is pressed and wrung out with pinch rollers. For higher viscosity oils, the medium tends to mat down and lose effectiveness. A decant system is a must for these units, as water pickup can be very high. Also, replacement oil mops can be very expensive, so check prices on replacements before purchasing.

■ **Large Tube Oil Skimmers:** Tube oil skimmers use a floating plastic hose that snakes out over the surface of the liquid and is then drawn back through the drive unit where oil is removed. This design requires a relatively large amount of surface area for proper operation. This oil skimmer can skim from very shallow tanks. As a rule, the removal capacity is lower than belt, drum or mop type oil skimmers.

Abanaki
Tube Skimmer

■ **Mini Tube Oil Skimmers:** Very similar to the large tube units, but use either a 3/16" or a 5/16" tube instead of 1". The pickup rate varies from 1 quart/hour to 1.5 gph depending on the diameter of the tube. These units are fairly compact, and can fit in tight spots. The better units will have the motor mounted underneath, to bring room required over the lip of the tank down to near zero. The 5/16" diameter tube is preferable as it has a 1 gph removal capacity and enough stiffness to not drag on the housing and prematurely wipe off oil when being drawn into the unit.

■ **Floating Suction Oil Skimmers:** These come in several forms, but all have a floating intake. They are most suitable for relatively thick layers of oil (1/4 inch or higher); otherwise, they tend to ingest large amounts of water. Some machines will actually emulsify oil due to churning as it passes through the suction pump. This type of oil skimmer requires a coalescing or at least a decanting unit to be at all effective.

Specifying an Abanaki Oil Skimmer for Your Application

Removal Capacity

Capacity should be based on the maximum amount of oil to be removed within the shortest available time. For instance, total oil influx may be 200 gallons in a 24 hour period, which averages about 8.3 gallons per hour. But if most of it comes during a single eight hour plant shift, you will probably need a removal rate that is three times as high, especially if you are trying to prevent an unwanted discharge of contaminated water to a sewer system. As a rule-of-thumb, specify approximately twice the maximum capacity you anticipate needing for normal conditions.

Abanaki Oil Skimmer Models

Oil Skimmer Belt and Tube Length: Removal capacity is not affected by length. Choose a length that: assures contact with the liquid at its lowest level; allows easy mounting of the oil skimmer where oil discharge is convenient; and has good access for routine service. Abanaki's ability to supply oil skimmers with long belts, and lift skimmed oil well over 100 feet with no loss in capacity or efficiency, is important to many users.

Disk Diameter: The disk must always be touching the fluid. Size the diameter accordingly.

Wiper Blades

Abanaki offers 4 wiper blade materials for a variety of operating environments. The standard is Nitrile (also known as Buna-N), which is appropriate for about 80% of all applications. Optional materials are designed for applications with harsh operating conditions. The materials include: CRV (very high chemical resistance), ceramic hybrid (excellent lubricity and moderate chemical resistance), and stainless steel wipers.

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Motor Types

All Abanaki oil skimmers are designed with standard, industrially rated, continuous duty motors and fully enclosed speed reducing drives. Most of these oil skimmers can be specified with the following motor options:

- Any standard or exceptional electrical requirement
- Explosion proof
- Drip proof
- Tropicalized
- Dirty duty
- Food service
- Wash down duty
- DC motors
- ATEX/ European motors

Contact Abanaki regarding availability of special motors, controls, and drive components to satisfy unusual requirements.

Choosing the Right Belt Material for your Abanaki Belt Oil Skimmer

Abanaki offers 5 different belt materials. The chart indicates which material is most suitable for common situations. However, belt performance and durability depends on the nature of the liquid, its chemical composition, temperature, etc. For instance, high temperature increases a belt's sensitivity to pH levels. To make sure the belt oil skimmer performs satisfactorily in your application, Abanaki offers free samples of belt material for test purposes.

Belt Capabilities	Belt Materials				
	CR Steel	Elastomer	Poly	XP-Poly	Fuzzy
Temperature Range	<220°F (104°C)	<120°F (49°C)	<160°F (71°C)	<180°F (82°C)	<160°F (71°C)
pH Range 2-13*	Yes	Yes	Yes	Yes	Yes
Operates in the presence of grit fines and other suspended particles	No	Yes	Yes	Yes	No
Removes certain DNAPL's and some emulsified oils	No	No	Yes	No	Yes
Effective for very light oils	No	No	No	No	Yes

*At ambient temperatures.

Optional Equipment

Abanaki accessories make it easy to customize your oil skimming system for quick installation and optimal performance. Listed below are the most commonly requested items. More specialized accessories are available on request.

Solar Oil Skimming System

The solar oil skimming option is ideal for locations that do not have access or have limited access to electricity. A 12V DC motor runs off a deep cycle battery that is recharged by the solar panel. Various 12V accessories are available as well.

Transfer Package and Underground Oil Skimming System

This option is for applications in which the oil storage tank is far from the point of oil removal or for below



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ground applications. This turnkey system consists of a small collection tank, a pump, small control panel and three float switches. The oil that the oil skimmer picks up is deposited to the collection tank. When the collection tank is full, the middle float switch signals the pump to turn on. The oil is then pumped to your storage tank or facility for permanent removal or storage.

Controls/Accessories

Abanaki offers a float switch and warning light combination to monitor fluid level in the skimmed oil collection drum, which helps prevent overflow. Other electrical options include timer, heater, and control panel. Abanaki also offers poly shelters and discreet secure enclosures as well as a variety of mounting options for the oil skimmer.

Concentrators: Abanaki Oil Concentrators® provide a secondary separation step after oil skimming to virtually eliminate water from skimmed product. Units are available for easy installation on most Abanaki oil skimmers.