

# QED Pumping Technologies

## Free Product Recovery Systems

### Genie® Systems

The Genie systems use a high-suction pump to draw in free product through a floating inlet that tracks changes in liquid level in the well.

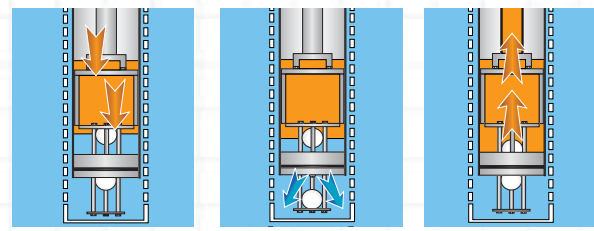
**Pump** – The air-powered Genie pump's special, high-rebound bladder creates high suction to more reliably draw in fluids, even when debris or high viscosities are present. The pump discharges fluid when the bladder is pressurized, and draws in fluid when the pump enters the vent cycle and the special bladder rebounds. The bladder prevents the drive air from contacting the pumped fluid.

**Floating inlet types** – The SPG inlet float is buoyant in water and sinks in hydrocarbon to keep its inlet ports above water. Multiple, selectable inlet ports allow fine-tuning of the floating layer thickness that can be achieved. The SOS inlet uses a hydrophobic screen to avoid taking in water.

**Control options** – The basic controls alternate pressurizing and venting of the Genie pump bladder automatically, while programmable controls allow setting system "OFF" periods to match the recovery rate of hydrocarbons into the well.

### Ferret® Systems

The Ferrets work like a miniature oil/water separator inside a gas displacement pump downwell, using compressed air to expel water back into the well and pumping free product to the surface. Floating and fixed inlet versions are offered.



**Separator function** – The Ferret separates water and LNAPL layers inside the pump with a special inlet valve that responds to the specific gravity of the fluid. Fluid flows into the Ferret by hydrostatic pressure when it is vented to atmosphere by the controller. The Ferret is then pressurized with compressed air; if water is present at the inlet valve, the valve remains open and the water is returned to the well; if a lighter-than-water hydrocarbon is present at the inlet valve, the inlet valve closes and the hydrocarbon is discharged through the outlet valve and to the surface for collection.

**Inlet types** – The Ferret is offered with either a floating inlet to track changes in liquid level in the well, or a fixed inlet to provide the simplest, largest possible inlet flowpath for wells with debris or biogrowth.

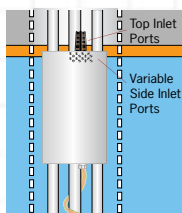
**Control options** – Ferrets use electronic controllers at the wellhead for easy keypad adjustment of pump refill/discharge cycle times as well as setting system "OFF" periods to match the recovery rate of hydrocarbons into the well.

### Passive Skimmers

Passive skimmers use floating inlets coupled to a simple downwell collection chamber. The passive skimmer is raised to the surface to be emptied, then lowered back into the well for another fill cycle.

### AutoSkimmer®

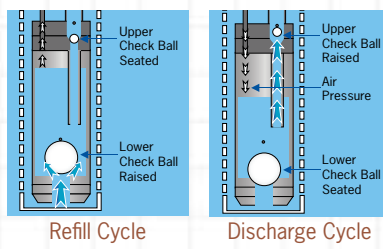
The AutoSkimmer combines a floating inlet with the air-powered automatic AutoPump®, which cycles only when the pump fills with liquid. No external controller is needed. When the floating layer has been substantially removed from the well, the AutoSkimmer can then be converted to a top fill, total fluids pump for extraction of contaminated water.



## DNAPL Removal Systems

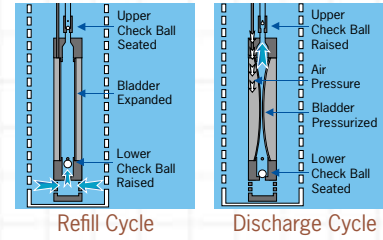
### Pulse Pump®

The Pulse Pump is a simple, gas displacement pump with just two moving parts in the fluid – the inlet and outlet check balls. An external, surface-mounted controller alternately pressurizes the pump chamber to discharge the contents to the surface, then vents the pump body to allow it to refill again by hydrostatic pressure.



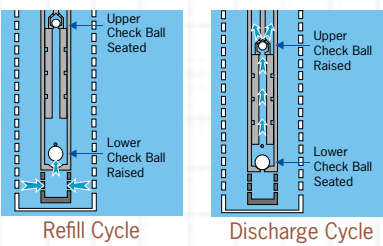
### Eliminator®

The Eliminator is a heavy-duty bladder pump with just three moving parts – the bladder and the inlet and outlet check balls. An external, surface-mounted controller alternately pressurizes the pump chamber to discharge the contents to the surface, then vents the pump body to allow it to refill again by hydrostatic pressure.



### Iron Horse®

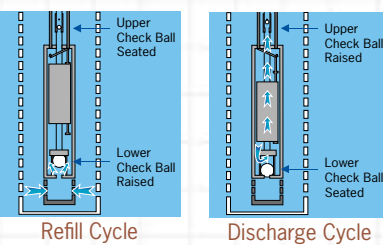
The Iron Horse is a downwell piston pump driven by a wellhead air-powered driver. Piston pumps are capable of handling viscous fluids and have no contact between the drive air and the pumped fluid.



## Total Fluids/Vapor Extraction

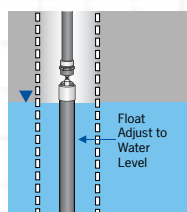
### AutoPump®

The AutoPump is an air-powered, automatic pump for total fluids. An internal float operates an air control valve inside the pump, applying compressed drive air to the pump chamber when it fills and raises the float, and venting the pump chamber when it is emptied and the float falls. This automatic cycling applies compressed air efficiently, only when needed, and the pump shuts itself off if the liquid level falls in the well.



### AutoTracker®

The AutoTracker is a floating, high performance inlet that replaces traditional "stinger" tubes or pipes in vacuum extraction systems. The floating action allows the extraction system to operate more consistently and efficiently when liquid levels change in the well.



## Beyond the Basics...

Success with a free product recovery system involves more than just the basic hardware. QED's 20 years of specialized air-powered pumping experience on thousands of sites with a broad range of applications has built a strong base of expertise and problem solving capabilities. QED technical experts will work with you on identifying the relevant site information important to meeting your project objectives for free product or DNAPL recovery. The equipment will be selected to meet your site-specific application.

## Accessories

- Downwell hose and tubing
- An array of connectors and fittings for ease of installation and service
- Mix of wellhead assemblies to meet specific site needs
- Fluid discharge and air supply components
- Tank full shutoff and other control and safety items
- Custom requirements

Call us at

**800-624-2026**

for prompt, expert assistance on your project needs.

Or visit us on the web at

**www.qedenv.com**

**The World Leader in Air-Powered Pumps**  
For Remediation, Landfills and Groundwater Sampling

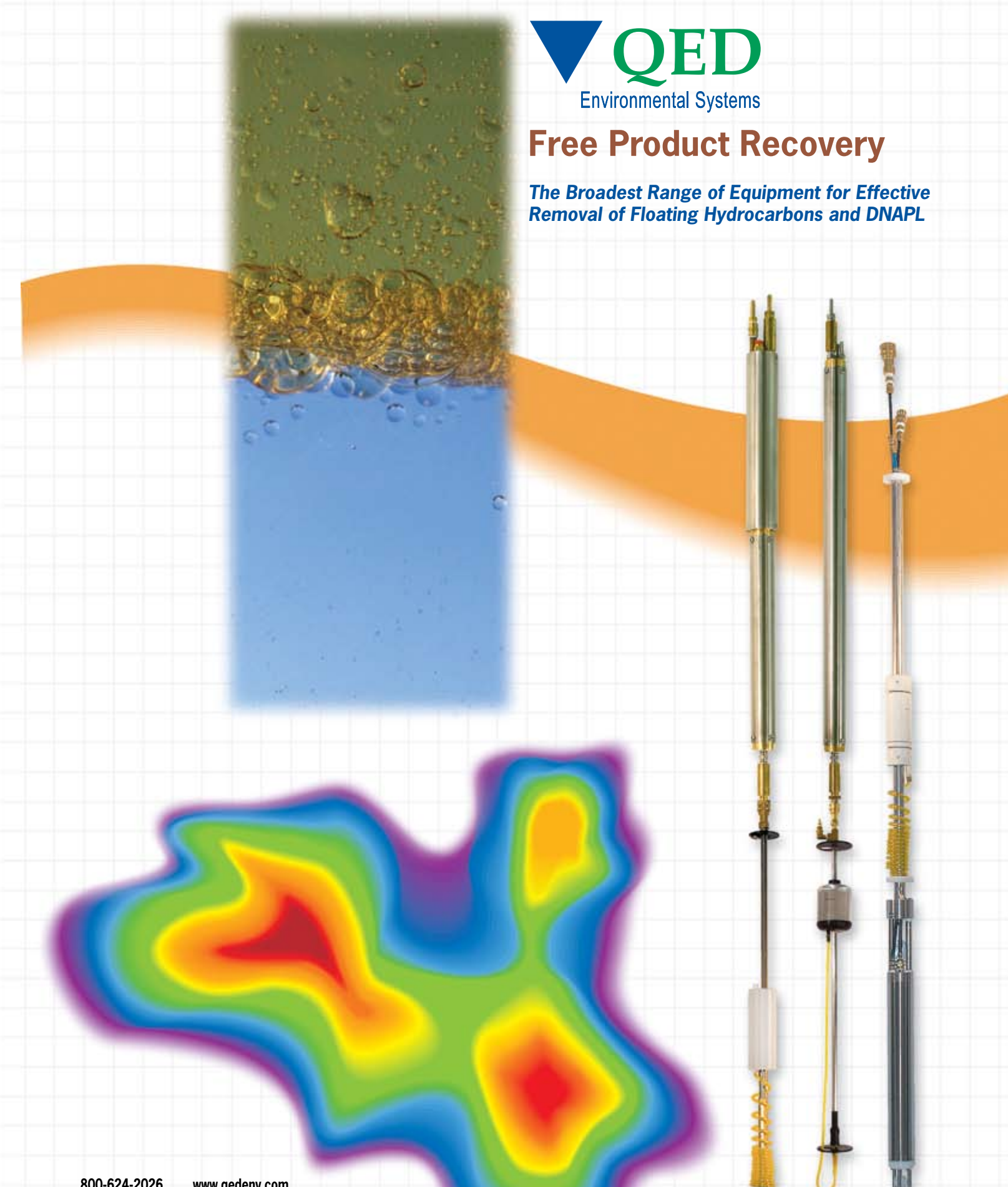


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## Free Product Recovery

*The Broadest Range of Equipment for Effective Removal of Floating Hydrocarbons and DNAPL*

# The QED Advantage

Proven equipment, expert help with its selection and installation, and support you can count on when you need it

## How Free Product and DNAPL Remediation Site Conditions Affect Equipment Selection

Selecting the best equipment for LNAPL and DNAPL source reduction depends on matching it to the site conditions and project goals. The major factors to consider are:

**What are the project goals and constraints?** The starting point for equipment selection is the consideration of factors such as: the importance of pumping LNAPL or DNAPL only, and not water; the expected duration of the project and total volume of LNAPL or DNAPL to be removed; the availability of site labor for service; and the overall budget.

**Does everything fit into the well?** Dimensions such as well diameter, well depth, depth to water and its fluctuation, and LNAPL or DNAPL layer thickness control what equipment can fit.

**What's being removed?** The type of fuel or solvent, its viscosity, density, temperature, age of spill, and the presence of biological growth or debris affect equipment performance.

### What LNAPL or DNAPL removal rate is needed?

The conductivity of the formation, the LNAPL or DNAPL recovery rate in the wells, and the pumping strategy determine the maximum LNAPL or DNAPL flow rate that will be required.

You can get prompt, expert assistance on equipment selection by calling QED to speak to an experienced applications specialist, at **800-624-2026**.

## Put Our Experience to Work for You – Now!

Need experienced guidance selecting the right equipment for your application?

Call us at **800-624-2026** or email **info@qedenv.com**.

Request the full 48 page **Free Product Recovery Equipment Catalog**

## Free Product Recovery Equipment Application Overview

	SOS® AutoGenie™	SPG® AutoGenie™	SOS® Programmable Genie™	SPG® Programmable Genie™	Ferret® Floating Inlet	Ferret® Filled Inlet	AutoSkimmer™ Pump System
Fresh gasoline	✓	✓	✓	✓	✓	✓	✓
Weathered diesel or fouled fuel conditions		✓		✓			
LNAPL target layer thickness <2 in.	✓		✓		✓	✓	
LNAPL target layer thickness >2 in.	✓	✓	✓	✓	✓	✓	✓
Water table fluctuation <12 in.	✓	✓	✓	✓	✓	✓	✓
Water table fluctuation >12 in.	✓	✓	✓	✓			✓
Below-grade vault well termination needed	✓	✓					✓
Water exclusion extremely important					✓	✓	
System off-time control important			✓	✓	✓	✓	
Water column below floating layer <18 in.	✓	✓	✓	✓			
No contact of drive air with pumped liquid	✓	✓	✓	✓			
Well Diameter	4"	2" 4"	4"	2" 4"	2" 4"	2" 4"	4"
Maximum Recovery Rate (gpd)	320	320	320	320	100 275	100 300	320
Float Travel Range	12" 24" 48"	15" 24" 45" 60"	12" 24" 48"	15" 24" 45" 60"	12"	Fixed	16"
Maximum Viscosity (cSt)	200	1,000	200	1,000	4 350	100 1,000	1,000
Maximum Well Depth	150'	150'	150'	150'	200'	200'	200'

	SOS® AutoGenie™	SPG® AutoGenie™	SOS® Programmable Genie™	SPG® Programmable Genie™	Ferret® Floating Inlet	Ferret® Filled Inlet	AutoSkimmer™ Pump System
Maximum Recovery Rate (gpm)	1.8	7.5	.13	6	2	5	
Maximum Well Depth	230'	230'	150'	230'	400'	180'	

## DNAPL Recovery Equipment Application Overview

	Pulse Pump®	Eliminator™	Iron Horse™
Well Diameter	2"	4"	2" 4" 3" 4"
Maximum Recovery Rate (gpm)	1.8	7.5	.13 6 2 5
Maximum Well Depth	230'	230'	150' 230' 400' 180'

## Total Fluids Recovery

	AutoPump®
Well Diameter	2" 4"
Maximum Flow Rate (gpm)	1.6 10
Maximum Well Depth	300' 425'

## Vapor Extraction

	AutoTracker® Vacuum Extraction Inlet
Well Diameter	2" 4"
Maximum Flow Rate (gpm)	1.6 10
Maximum Well Depth	300' 425'

Floating Extraction Inlets track changing water levels to maintain optimum performance.



**C100M Digital Controller**  
Solar-powered, digital controller can be used to set pump refill and discharge cycle times and variable "off" times.



**L360 Pulse Sender Pneumatic Controller**  
Provides a rugged, all-pneumatic control of pump cycle times where no electronics are allowed.



**L370 LevelMate**  
Provides on/off level control and can be used with the L360 to shut off the system when the well level drops below the set point.



**Tank Full Shutoff**  
All-pneumatic tank full shutoff controls in wall-mount and tank-mount versions.



**Tubing and Hose**  
QED offers a variety of materials of construction for both tubing and hose to meet the extremes of fluid chemistry and temperature.



**Well Caps**  
Hundreds of wellhead cap and flange combinations are available to fit site needs and ease installation and service.



**YellowJacket Interface Meter**  
Oil/water interface meter used to measure the thickness of floating or sinking hydrocarbons in groundwater accurately, safely, and reliably.



**TH3 Compressor**  
Compact 1.25 HP, single piston, AC-powered compressor can be the perfect fit for small LNAPL recovery systems.

## Representative Properties of Selected Fluids



Liquid	Specific Gravity	Viscosity
SAE 30W oil	.88-.94 g/cm <sup>3</sup> 60°F (15.6°C)	9.6-12.9 cSt 210°F (98.9°C)
SAE 85W oil	.88-.94 g/cm <sup>3</sup> 60°F (15.6°C)	11.0 cSt min 210 (98.9°C)
SAE 90W oil	.88-.94 g/cm <sup>3</sup> 60°F (15.6°C)	14.0-25 cSt min 210 (98.9°C)
Benzene	.899 g/cm <sup>3</sup> 32°F (0°C)	1.0 cSt 32°F (0°C)
Corn Oil	.885 g/cm <sup>3</sup> 60°F (15.6°C)	.744 cSt 68°F (20°C)
	.924 g/cm <sup>3</sup> 60°F (15.6°C)	28.7 cSt 130°F (54.4°C)
Creosote	1.04-1.10 g/cm <sup>3</sup> 60°F (15.6°C)	8.6 cSt 212°F (100°C)
		130°F (54.4°C)
Crude Oil 40	.825 g/cm <sup>3</sup> 60°F (15.6°C)	9.7 cSt 60°F (15.6°C)
Diesel fuel 2D	.82-.95 g/cm <sup>3</sup> 60°F (15.6°C)	2.0-6.0 cSt 100°F (37.8°C)
Diesel fuel 5D	.82-.95 g/cm <sup>3</sup> 60°F (15.6°C)	1.0-3.97 cSt 130°F (54.4°C)
		86.6 cSt max 122°F (50°C)
Fuel Oil #2	.82-.95 g/cm <sup>3</sup> 60°F (15.6°C)	35.2 cSt max 160°F (71.1°C)
		3.0-7.4 cSt 70°F (21.1°C)
Fuel Oil #3	.82-.95 g/cm <sup>3</sup> 60°F (15.6°C)	2.11-4.28 cSt 100°F (37.8°C)
		70°F (21.1°C)
Fuel Oil #6	.82-.95 g/cm <sup>3</sup> 60°F (15.6°C)	2.06-3.97 cSt 100°F (37.8°C)
		97.4-660 cSt 122°F (50°C)
Gasoline	.72 g/cm <sup>3</sup> 60°F (15.6°C)	160°F (71.1°C)
		.64 cSt 60°F (15.6°C)
Honey		73.6 cSt 100°F (37.8°C)
Cutting Oil		40.0-46 cSt 100°F (37.8°C)
Kerosene	.78-.82 g/cm <sup>3</sup> 60°F (15.6°C)	23.0-26 cSt 130°F (54.4°C)
		2.71 cSt 68°F (20°C)
Jet Fuel	.82 g/cm <sup>3</sup> 60°F (15.6°C)	7.9 cSt -30°F (34.4°C)
Molasses	1.40-1.46 g/cm <sup>3</sup> 60°F (15.6°C)	281-5070 cSt 100°F (37.8°C)
Naphthalene	1.145 g/cm <sup>3</sup> 68°F (20°C)	.9 cSt 176°F (80°C)
Olive Oil	.91-.92 g/cm <sup>3</sup> 60°F (15.6°C)	43.2 cSt 100°F (37.8°C)
		24.1 cSt 130°F (54.4°C)
Pine Tar	1.06 g/cm <sup>3</sup> 60°F (15.6°C)	559 cSt 100°F (37.8°C)
Turpentine	.86-.87 g/cm <sup>3</sup> 60°F (15.6°C)	86.6-95.2 cSt 100°F (37.8°C)
		1.13 cSt 60°F (15.6°C)
Fresh Water	1.0 g/cm <sup>3</sup> 60°F (15.6°C)	.55 cSt 130°F (54.4°C)
Whale Oil	.925 g/cm <sup>3</sup> 60°F (15.6°C)	35.0-39.6 cSt 100°F (37.8°C)
		19.9-23.4 cSt 130°F (54.4°C)

Based on material from the Hydraulic Institute with additions by Ingersoll-Rand cSt = Centistokes



### Characterize Your Specific Site

The QED Test Kit enables you to measure the density and viscosity of your actual floating hydrocarbon layer. This FREE, do-it-yourself kit comes complete with simple, illustrated instructions. Once you have recorded the results of your hydrocarbon test, QED application specialists will be able to provide expert technical assistance in system design and specification.