

Hydrocarbon Recovery System

Single & Multi-Well Solar Sipper

The Solar Sipper is a solar powered remediation system, designed for remote applications where electrical power is either not available or not economically feasible. This uniquely flexible system can be configured for up to eight wells. The compact, easy to install features make this unit efficient to move and implement multiple wells.

The Solar Sipper uses a unique downwell pump to recover hydrocarbons through a floating oleophilic/hydrophobic intake filter. Once the pump canister is filled via the vacuum cycle, the pump reverses, pressurizes the system and pumps the recovered fluid to the surface and into a storage vessel.

The Solar Sipper can effectively extract fluids from depths to 180 feet below ground surface and recover viscous hydrocarbons such as 90 weight oil when our heavy oil skimmer is utilized.

EASE OF DEPLOYMENT

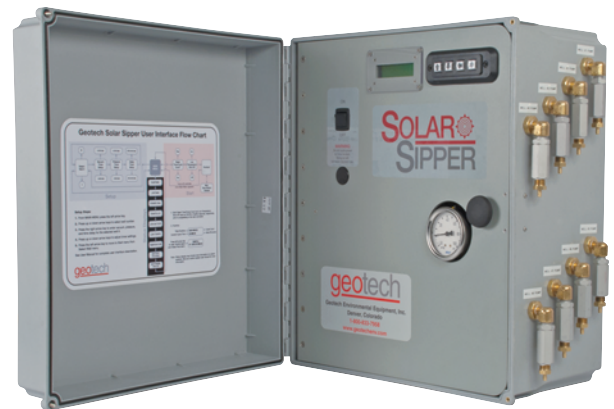
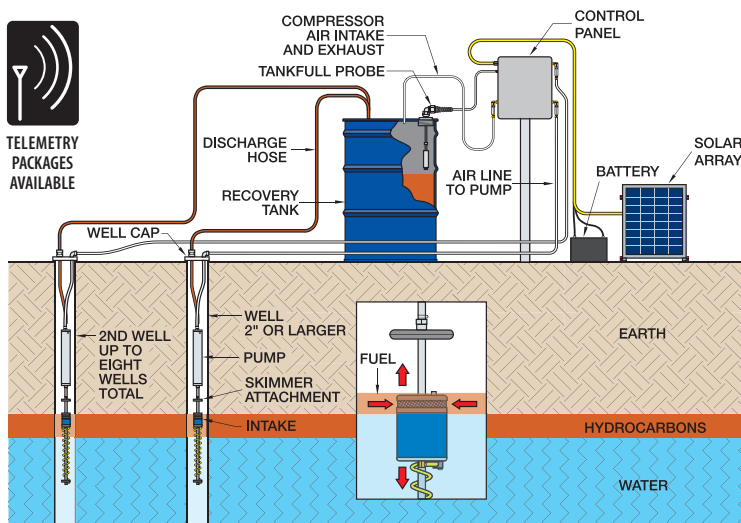
The Solar Sipper can reduce overall project costs and dramatically improve deployment:

- Available in single or multi-well configurations
- Reduces the time and cost for a power line to be run to a site.
- Eliminates the need for electricians to do install work and permitting.
- The simple and safe low voltage system can be installed without special training or licensing and requires minimal experience.
- No trenching or transformer equipment is required.
- Relocating equipment to follow a plume or to adjust to new site characterization information is fast and easy.

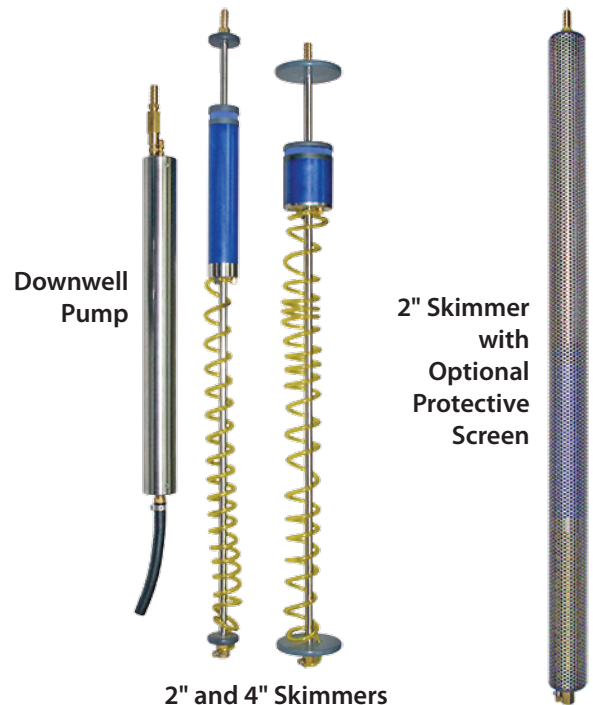
OPERATION

The Solar Sipper recovers floating hydrocarbons (LNAPL) from wells using a solar powered pressure/vacuum pump. The standard Skimmer features a unique product intake assembly that incorporates both a density float and an oleophilic/hydrophobic filter that differentiates between floating hydrocarbons and water. The skimmer floats just above the oil/water interface to collect and remove hydrocarbons from the well into an optional above ground storage tank.

The Solar Sipper is also available for recovery of sinking product (DNAPL) from wells when using a fixed intake.



Control Panel and Pressure/Vacuum Pump
(eight-well controller shown)



Hydrocarbon Recovery System

Single & Multi-Well Solar Sipper

DESIGN YOUR RECOVERY SYSTEM

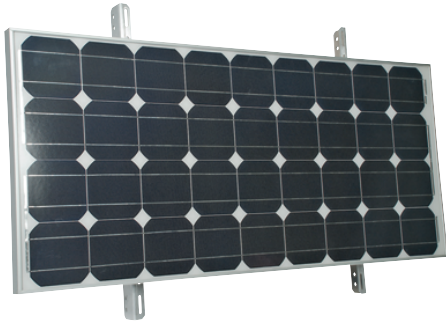
Step 1: Control Panel

- ✓ Choose from 1 to 8 wells
 - NEMA 3R Enclosure
 - Tankfull Shut-Off Switch (¾" or 2" NPT bung-fitting)
 - Microprocessor Controlled 2-Line LCD Display with four scroll buttons
 - On/Off Switch
 - Pressure/Vacuum Pump
 - Pressure/Vacuum Gauge

Step 2: Solar Accessories

- ✓ 100 watt solar panel(s) with adjustable mounting frame
- ✓ AGM Solar Batteries 104 AH, 12 Volt

AC powered versions are available



Step 3: Downwell Equipment

- ✓ Downwell Pump(s)
 - Standard
 - With Conductivity Sensor
- ✓ Skimmer(s)
 - 2" or 4" Skimmer with 100 or 60 Mesh Intake
 - 2" or 4" Protective Screen
 - 4" Skimmer with Extended Travel
 - 4" Heavy Oil Skimmer
 - 4" High Temperature/Heavy Oil Skimmer
 - 2" DNAPL Intake

Other Options:

- ✓ 2" or 4" Slip Fit Well Cap(s)
- ✓ Choose Length: Air and Discharge Tubing
- ✓ 55 Gallon Steel Product Drum(s)
- ✓ Tank Manifold: 2 to 8 Wells
- ✓ Dual-Wall Containment Product Recovery Tank(s)
- ✓ Lockable Weatherproof Enclosure
- ✓ Trailer for Mounting Mobile System
- ✓ SitePro with SiteView Telemetry



3-Well Solar Sipper on trailer with dual containment tank



Solar Sipper installation with bovine protection



Solar Sipper installation mounted on hazmat enclosure

Hydrocarbon Recovery System

Single & Multi-Well Solar Sipper

SPECIFICATIONS

Applications:	2" (50 mm) or larger recovery wells
Recovery Rate:	.2 gallons (76 ml) per cycle
Maximum Operating Depth:	180 feet (55 meters)
Power Requirements:	12-15 Volts DC input @ up to 14.5 Amps 90 ~240 Watts continuous
Maximum Pressure:	100 PSIG (7 bar)
Maximum Vacuum:	20" Hg @ MSL (50 mm Hg)
Oil/Water Separation:	Oleophilic/hydrophobic mesh screen
Controller:	
Operating Temperature	32° to 104°F (0° to 40°C)
Storage Temperature Range	-20° to 150°F (-29° to 66°C)
Humidity	90% non-condensing (max)
Size	10" D x 18" T x 16" W (25.4 cm D x 45.7 cm T x 40.6 cm W)
Approximate Weight	34 lbs. (15.4 kg) single channel 49 lbs. (22. 2 kg) eight channel
Rating	NEMA 3R
Optional Solar Panel w/Frame:	
Rated Power	100 Watts (standard unit)
Operating Voltage	17.4 Volts DC
Maximum Voltage	21.5 Volts DC
Operating Amperage	4.88 Amps (standard unit)
Maximum Amperage	5.8 Amps
Size	43.31" x 28.15" x 3.15" (110 cm x 71.5 cm x 8 cm)
Approximate Weight	19.62 lbs. (8.90 kg)
Solar Panel Mounting System:	
Module Tilt Range	15 to 65 degrees
Pole Size	2" (5 cm), 4" (10 cm), and 6" (15 cm)
Module Orientation	Landscape/Portrait
Maximum Wind Speed	125 mph (200 kph)
Wind Exposure	Category B & C
Materials	5052-H32 Aluminum, Powder Coated Steel, Stainless Steel Fasteners

Optional Downwell Pump:

Size	23.5" L x 1.75" OD (59.7 cm L x 4.4 cm OD)	
Weight	4.5 lbs. (2.04 kg)	
Materials	303 and 304 Stainless Steel, Flexible Rubber Tubing, PVC, Brass	
Optional Skimmer Assemblies:	2" Model	4" Model
Effective Travel Range	12" (30.5 cm)	24" (61 cm)
Size	35.5" L x 1.75" OD (90.2 cm L x 4.4 cm OD)	35.5" L x 3.75" OD (90.2 cm L x 9.5 cm OD)
Weight	1.75 lbs. (.79 kg)	2.25 lbs. (1.02 kg)
Operating Temperature	32° to 104°F (0° to 40°C)	
Storage Temperature	-20° to 150°F (-29° to 66°C)	
Materials	304 Stainless Steel, Polyethylene, PVC, Polypropylene, Brass	
Optional Tubing:		
Air	.17" ID x .25" OD (4.3 mm ID x 6 mm OD)	
Discharge	.375" ID x .5" OD (9.5 mm ID x 12.7 mm OD)	