

# INNOVATIONS IN DUAL-PHASE REMEDIALTION SYSTEMS



The image shows three vertical tubes, each containing a floating extraction inlet. The tubes are filled with water, and the water level is indicated by a blue bar at the bottom of each tube. The floating inlets are positioned at different heights within the tubes, demonstrating their ability to track changing water levels. The tubes are connected to a central black pipe that runs through the water. The background is a blue gradient with a subtle pattern of water ripples.

## AUTO TRACKER™

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

 **QED**  
Environmental Systems

# How to Supercharge Your Dual-Phase Extraction Project



The patented AutoTracker™ Floating Extraction Inlet optimizes dual-phase extraction and bio-slurping system performance by assuring proper air-to-water ratios even as water levels change.

Groundwater fluctuations can cause severe disruptions for dual-phase extraction and bio-slurping systems using a fixed entrainment drop pipe.

When the water table falls below the elevation of a fixed extraction inlet, groundwater recovery ceases and treatment efficiency decreases. When the water level rises above the end of a fixed inlet, vapor recovery becomes impossible. AutoTracker Floating Extraction Inlets eliminate these common causes of system shutdowns and missed recovery goals.

## Background

Dual-phase extraction (DPE) is the simultaneous recovery of gases and liquids from the same remediation well without the use of pumps and controls at each well. High velocity vapor flow entrains the water and allows it to be extracted from depths beyond the static suction capability of the vacuum source.

With the right site conditions and with the gas and liquid inlets properly positioned, this can be a highly effective method of contaminant recovery from both the saturated and vadose zones. However, installation of systems with a fixed entrainment tube can be complicated and time-consuming, and changing liquid levels in the remediation well can cause costly downtime and necessitate frequent site visits for maintenance, increasing both O&M and life cycle costs.

AutoTracker™ (U.S. Patent Number 6,520,259) Floating Extraction Inlets from QED will deliver optimum performance from your DPE system by continuously and automatically reacting to changes in well level, positioning gas and liquid inlets properly and allowing the system to function at peak efficiency at all times. Case studies (see back cover for details) with AutoTracker show that you can:

- Cut O&M costs by 20% instantly
- Clean up your site 33% faster
- Save 1/2 of the life cycle cost.

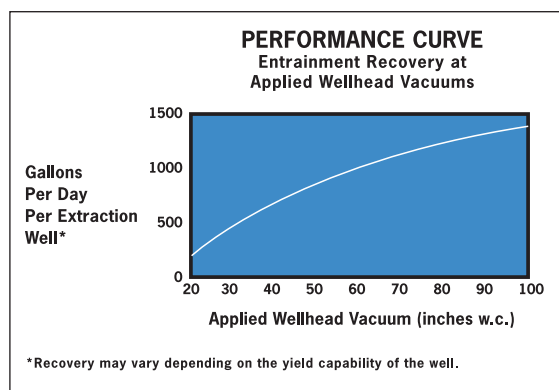
## AutoTracker Applications:

### Dual-phase extraction (DPE)

This extraction method was developed primarily for treatment of soils and aquifers contaminated by volatile hydrocarbons and other chemicals, by means of recovering soil vapor and groundwater from the vadose and saturated zones.

### Bio-slurping

This method combines bioventing with free product recovery. An inlet positioned right at the liquid surface recovers any floating product, along with soil vapor and only minimal groundwater. Air drawn into the soil to replace the evacuated soil gas stimulates bioremediation by supplying oxygen to in-situ microbes; limiting groundwater extraction helps prevent the creation of a smear zone that could otherwise be caused by the floating layer contacting fresh soil horizons.



## SPECIFICATIONS

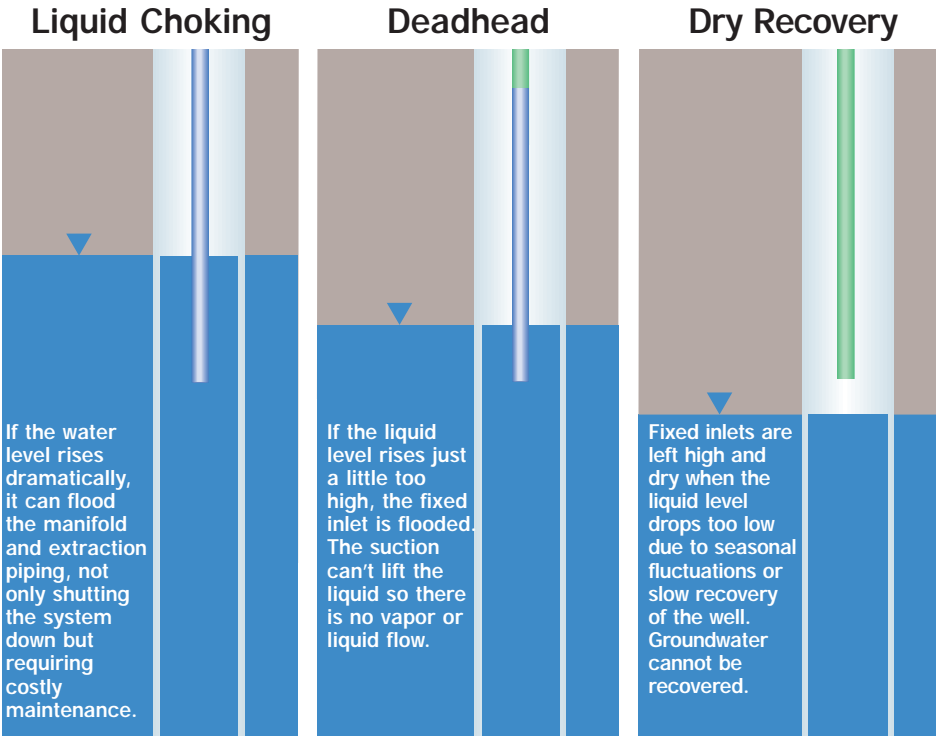
Model No	Floating Inlet Travel Range	Minimum Well Depth Below Top of Casing Needed to Achieve Full Travel Range	Elevation Range of Floating Inlet Travel with Minimum Well Depth	Float Length	Floating section O.D.	Weight
AT-5	5 ft	13' 9"	8' 9" - 13' 9"	33-1/2"	2.80" max.	5.8#
AT-10	10 ft	23' 9"	13' 9" - 23' 9"	33-1/2"	2.80" max.	5.8#

AutoTracker includes floating inlet, telescoping PVC connecting pipe, and well cap and bottom fitting for attachment to locally provided 2" PVC drop pipe.

## THE PROBLEM WITH CONVENTIONAL FIXED DROP PIPE SYSTEMS

The operation of a conventional fixed drop pipe DPE system depends on precise positioning of the inlet at or just below the water table. It is this positioning which allows the system to recover both vapor and liquid, entraining them into a high-velocity stream that lifts the water from greater depths than possible by suction effects alone.

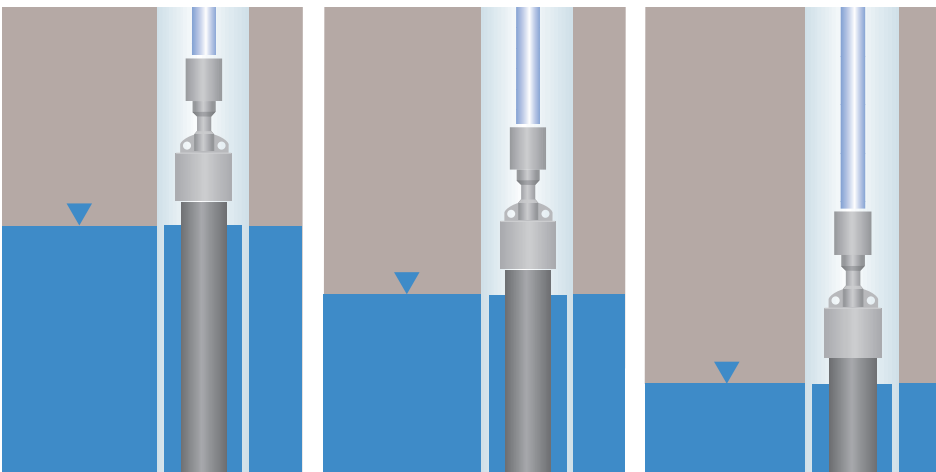
When inlet position and blower vacuum are properly adjusted, this type of system is very effective. However, even small changes in well liquid level can shut the operation down, causing major disruption in recovery and treatment schedules.



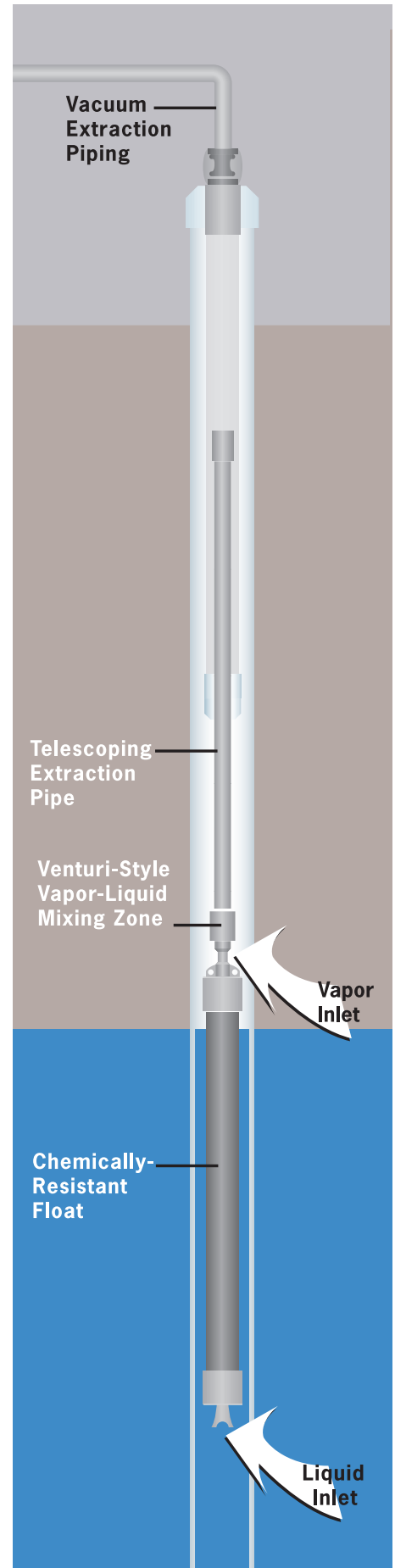
## AUTO TRACKER ELIMINATES THESE PROBLEMS

With its telescoping drop tube, the patented AutoTracker Floating Extraction Inlet automatically follows the water level, positioning air and water inlets properly at all times and preventing liquid choking, deadhead and dry recovery conditions.

In addition to minimizing operational downtime and maintenance requirements, AutoTracker systems are much faster and easier to install and start. There's no need for tedious, time-consuming adjustment of inlet positioning – the float positions itself, automatically and instantly. The only adjustment required is setting the vacuum level on the blower to deliver the desired liquid and vapor flow rates.



AutoTracker positions inlets for optimal performance at any well level.



# Superfund Site

AutoTracker™ Floating Extraction Inlets were added to a DPE system at a remediation site in mid-Michigan following several years of operational problems caused by fluctuating water table levels. Installation was straightforward and system performance improved immediately, reducing on-site maintenance, labor and O&M costs and greatly improving groundwater recovery. Ongoing savings were so dramatic that payback for the initial capital cost was achieved in just 4 months! Projected over the project life cycle, cost savings should surpass \$600,000, with an expected 10-year reduction in time to reach the remediation target.

### Site Background Data:

- 12 well dual-phase extraction system
- 2-acre encapsulation and treatment cell
- Well depths: 20-40 feet bgs; static water level: 15-20 feet bgs
- Approx. 30,000 cubic yards of soils contaminated with chlorinated solvents
- 25 HP rotary lobe blower used
- Each well extracts 20-30 scfm of vapor at 10-13" Hg
- Recovered vapor & groundwater treated with vapor/liquid phase activated carbon

### History Prior to AutoTracker Installation:

- System operated 1999-2001 with fixed entrainment tubes
- Water level changes caused by seasonal fluctuations and/or blower shutdown resulted in dry recovery, deadhead and liquid choking conditions
- O&M costs increased by need for frequent manual adjustment and maintenance
- Air/groundwater recovery rates decreased due to extensive system downtime

### AutoTracker Performance:

- Floating Extraction Inlets installed summer 2002
- O&M costs reduced 20% due primarily to reduced labor
- Payback period less than 4 months
- Groundwater recovery rates nearly doubled
- Groundwater recovery cost per gallon reduced 59%
- Estimated project duration cut from 30 to 20 years
- Estimated life cycle cost savings: over \$600,000

### Cost Savings Demonstration

Parameter	Before Conversion to AutoTracker™	After Conversion to AutoTracker™
Annual O&M	\$44,500	\$35,500
Groundwater Recovery	460 gal/day	914 gal/day
Cost/Gallon Recovered	\$0.27	\$0.11
Capital Cost for 12 AutoTrackers	na	\$3,000
Payback Period	na	4 months
Estimated O&M Duration	30 years	20 years
Life Cycle Cost	\$1,335,000	\$710,000



P.O. Box 3726  
 Ann Arbor, MI 48106-3726 USA  
 Phone: 800-624-2026  
 Fax: 734-995-1170  
 www.qedenv.com  
 info@qedenv.com