Pore-Water Sample for Long-Term Monitoring Beneath Lakes and Streams

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APPLICATION

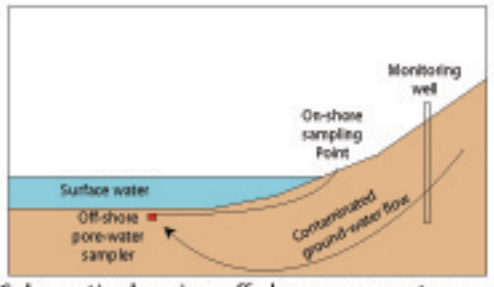
Pore-water samplers provide long-term sampling points for contaminated ground water immediately prior to discharging to surface water. Because much of the contaminant degradation along the ground-water flow path can take place in the microbially robust zone near the ground-water/surface-water interface, pore-water samplers near this zone have the potential to produce more realistic values for discharging contaminant concentrations than values obtained from an on-shore monitoring well.

ADVANTAGES

1. Can provide repeated samples from the same location.
2. Easy to use.
3. The sampler is self-filling with ambient formation water and does not need to be recharged manually.
4. Does not require a surface expression in the surface-water body, such as a standpipe that may be subject to disturbance by floating objects or current.
5. Samples from the middle of the surface-water body can be collected from the shoreline.

STUDY AREA AND SCHEMATIC DIAGRAM

Study area: Corpus Christi, Texas.
Long-term monitoring of ground-water chlorobenzene discharge to a ditch was needed



Schematic showing off-shore pore-water sampler connected to shoreline by tubing. Samples are collectected onshore by peristaltic pump

Table 1. Descriptions of sampling points in the drainage ditch, Installation Restoration Site 4, Naval Air Station Corpus Christi, Corpus Christi, Texas, 2005-06

Site shown on figure 2	Sampler identifier	Sampler type	Sampler depth, in feet below drainage-ditch bed
1	WDS1	1.4-inch-diameter pore-water sampler	1.0
1	PDBWD1	Polyethylene diffusion bag sampler	.33
1	SW1	1.4-inch-diameter pore-water sampler	.2
1	SW4	1.4-inch-diameter pore-water sampler	In surface water above ditch bed
2	WDS2	2.5-inch-diameter pore-water sampler	1.25
3	WDS3	2.5-inch-diameter pore-water sampler	1.5
3	PDBWD3	Polyethylene diffusion bag sampler	.33
4	WDS4	1.4-inch-diameter pore-water sampler	1.4
5	PDBWD4	Polyethylene diffusion bag sampler	.33

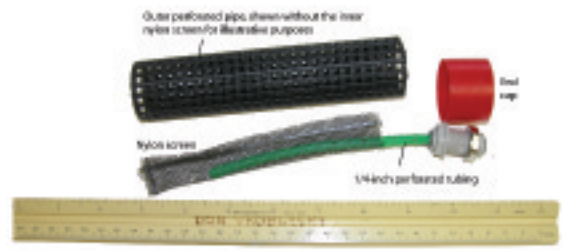
CONSTRUCTION

REFERENCE: Vroblesky, D.A., and Casey, C.C., 2007, Evaluation of pore-water samplers at a drainage ditch, Installation Restoration Site 4, Naval Air Station Corpus Christi, Texas, 2005-06: U.S. Geological Survey Scientific Investigations Report 2007-5154, 9 p

A 2.5-inch diameter pore-water sampler with scale.

Lengthwise exploded view.

Exploded endview of sampler



Exploded 1.4-inch diameter sampler

SUMMARY

The pore-water samplers were capable of collecting water from the sand and organic-rich mud beneath the ditch and in surface water in September 2005, and ground-water chlorobenzene was detected in water collected from all of the pore-water samplers. In August 2006, one sampler failed to provide water, probably because the tubing connecting the sampler to the shoreline was crushed by people and equipment walking in the ditch. This problem is easily solved by using a small-diameter PVC pipe as a protective shield for the tubing.

The constituent concentration data collected during this study show that the samplers can function as adequate long-term sampling devices for monitoring concentrations of ground-water contamination discharging to surface water.

Table 2. Concentrations of selected volatile organic compounds in water samples, Installation Restoration Site 4, Naval Air Station Corpus Christi, Corpus Christi, Texas, 2005-06.

[CB, chlorobenzene; 1,2-DCB, 1,2-dichlorobenzene; 1,4-DCB, 1,4-dichlorobenzene; <, Less than; J, estimated value; —, no sample; all concentrations are in micrograms per liter; suffix R represents a duplicate sample]

Location	Sampler number	Date	CB	1,2-DCB	1,4-DCB	Ethane	Methane
RS	RS	9/19/2005	57	<1.4	6.5	—	—
RS	RS	8/15/2006	72	1.45	7.18	<2	2,670
1	WDS1	9/19/2005	160	<5.6	16J	11	4,300
1	WDS1	8/15/2006	50.3	1.67	11.8	<2	1,730
1	PDBWD1	9/19/2005	74	<2.2	7.1J	—	—
1	SW1	9/19/2005	36	<5.6	<0.7	.66J	1,500
1	SW1	8/15/2006	3.05	.281	4.08	—	—
1	SW4	9/19/2005	2.3J	<1.4	<1.7	—	—
1	SW4	8/15/2006	15.6	<0.25	1.08	—	—
2	WDS2	9/19/2005	85	<2.2	3.1J	—	—
2	WDS2R	9/19/2005	110	<3.5	5.1J	—	—
2	WDS2	8/15/2006	54.5	.452	2.88	—	—
3	WDS3	9/19/2005	140	<3.5	9.8J	—	—
3	PDBWD3	9/19/2005	76	<0.56	5.8	—	—
4	WDS4	9/19/2005	66	1.8	7.5	—	—
4	WDS4	8/15/2006	79.4	1.58	8.67	<2	2,850
5	PDBWD4	9/19/2005	16	.84J	2.6	—	—