The Continuing Evolution of Groundwater Sampling

MoFlow
Volume Purge

LoFlow
Low-Flow

NoFlow
No-Purge/Passive

Kent Cordry
Highly Condensed Ground Water Sampling History

Volume Purging  1970’s-Present
Low-Flow    1990’s-Present
No-Purge (Passive)  2000- Present
Volume Purging

Purge 3 to 5 times the water contained in the well and surrounding filter pack, collect sample.
Stagnant Water

Well Under Static Conditions
Volume Purging Effects

Vertical Sample Interval?

Top View

Well

Sample Radius??
Advantages-Volume Purging

1. Standard and accepted method.
2. Easy to understand and implement.
3. Averages full screened interval.
4. Unlimited sample volume.*
Disadvantages

1. Data quality, prone to inconsistency.
2. Expensive and time consuming.
3. Large volume of purge water.
4. Samples full screen, and more.
5. Mobilizes solids, increased turbidity.
Low-Flow Sampling
Stagnant Water

Well Under Static Conditions
Low Flow Sampling

1. Very slow pumping rate.
2. Minimize drawdown in well.
3. Monitor indicator parameters.
Low Flow Sampling

Vertical Sample Interval ??

Sample Radius ??

Top View

Well
Advantages, Low Flow Sampling

1. Better data.
2. Lower sample turbidity
3. Reduced purge water volume.
4. Can be less expensive than purging.
5. Normally accepted by regulators.
6. Unlimited sample volume.*
Disadvantages

1. High initial equipment cost.
2. Requires operator training.
3. Sometimes no faster than volume purging.
4. Sample comes from undefined interval.
No-Purge/Passive Sampling
What is No-Purge Sampling?

- Collect a sample from a user defined interval within the well screen without prior purging.
No-Purge Sampling

Top View

Well

Sample Radius

Sample interval
Where Does the Sample Come From?

Low Flow

Volume Purge

No-Purge
HydraSleeve

Discharge Straw

Reusable Weight and Clip

Check Valve
Deployment
Sample Collection

Full

Empty

Sample interval is the length of Sleeve
Why No-Purge Sampling?

• Collect a Formation Quality Sample
Collect a Formation Quality Sample.
Why No-Purge Sampling?

• Collect a Formation Quality Sample
• Simple Logistics
1st Shipment to Install 45 Wells

2nd Round
Why No-Purge Sampling?

• Collect a Formation Quality Sample
• Simple Logistics
• Save Time and Money (50 to 80%)
Case Study-New England

- Low Flow Sampling - Required 2 weeks with 4 people.
- No-Purge - Required 4 days with 2 people.
Sampling Costs
From McClellan AFB Report 2005

*Based on 2-person team.
Why No-Purge Sampling?

• Collect a Formation Quality Sample
• Simple Logistics
• Save Time and Money (50 to 80%)
• Greener Sampling Method
  • No purge water disposal.
  • Minimize energy consumption.
  • Less exposure to safety hazards.
No-Purge Limitations

- Relatively new.
- *Limited sample volume.* One shot sample method.
- Results don’t always match other methods in all wells.
Total Volume of Saturated 10-Foot Schedule 40 Screen

*(most collect less than 50%)*

- 4-Inch = 25 liters
- 2-Inch = 6.4 liters (50% = 3-4 liters)
- 1-Inch = 1.7 liters
## ITRC Minimum Sample Volumes for Common Environmental Analytical Methods

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Asked For</th>
<th>Easily Accepted Minimum Volume for One Analysis</th>
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<tbody>
<tr>
<td>Alkalinity</td>
<td>200 (mls)</td>
<td>10 (mls)</td>
</tr>
<tr>
<td>Hex Chromium</td>
<td>300</td>
<td>5</td>
</tr>
<tr>
<td>Perchlorate</td>
<td>50</td>
<td>25</td>
</tr>
<tr>
<td>Total Hardness</td>
<td>100</td>
<td>10</td>
</tr>
<tr>
<td>VOC’s</td>
<td>140</td>
<td>20</td>
</tr>
<tr>
<td>BNAs</td>
<td>1000</td>
<td>250</td>
</tr>
<tr>
<td>Pesticides</td>
<td>1000</td>
<td>100</td>
</tr>
<tr>
<td>PCBs</td>
<td>1000</td>
<td>100</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>3790</strong></td>
<td><strong>510</strong></td>
</tr>
</tbody>
</table>
Why don’t the different sampling methods always compare?
If you sample the same water, you get the same results!
Why the increased use of no-purge sampling?

It provides formation quality groundwater samples with a 50-80 percent reduction in cost, time and energy consumption and improves site safety.
Innovative “Off Label” Uses...
Thank You!

Questions?

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