Arsenic in Groundwater in the Tolono, IL Region

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Illinois State Water Survey
Prairie Research Institute
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Some in area find levels of arsenic exceed standards

Sun, 02/27/2011 - 9:00am | Debra Pressey (users/dpressey)

Like 0 3

When Melinda and Bill Reich last had the well water at their home just outside Tolono tested 11 years ago, nobody was checking for arsenic.

But the national standard for the level of arsenic — a toxic element now linked to several cancers and other health hazards — considered safe in drinking water has changed since then.

So when the Reichs had their well water retested this past October, they decided to find out just how much arsenic has been coming out of their faucets.

Quite a lot, they were stunned to learn.

The new national standard for arsenic in public drinking water is now 10 parts per billion, but even under the old, more liberal 1942 standard of 50 parts per billion, the arsenic level in the Reichs' well would be considered very high, according to the Illinois State Water Survey.

According to the results of the first private lab test done last October, and a retest confirmed recently by the state water survey, Melinda Reich said the arsenic level in her family's well was about .154 parts per billion for the indoor water supply — which goes through a softener and filter before it comes into the house — and about .344 parts per billion for the outdoor water supply, which comes straight from the well.

She and her family have been using bottled water for cooking and drinking since October and are now waiting to hook up to an Illinois American Water line. Public water supplies have had to meet the new EPA standard for maximum arsenic level in drinking water since 2006.

The state water survey staff told her and her husband their well water is safe to bathe in, but nobody in the family is soaking in the tub these days.

"We're taking quick showers," she said.
Wells in Tolono Area

- Drilled into sand and gravel aquifers
  - Glasford Aquifer (shallower)
  - Pearl Aquifer (deeper)
  - These aquifers are laterally discontinuous and vary in thickness
- Bored
  - Shallow large-diameter wells not in an aquifer
Geological Formations in Tolono Area

- **Wisconsin Till**
- **Upper Glasford Fm.**
- **Vandalia Till**
- **Pre-Illinois Till**
- **Pearl Fm.**

Compiled by Andrew Stumpf
Quaternary Geology Section, Illinois State Geological Survey

Horizontal scale: 1 inch = 2,000 feet
Vertical scale: 1 inch = 100 feet
Vertical exaggeration: 20X
Arsenic in Tolono Area

Sampled wells and Samples from Database
Arsenic in Shallow Groundwater (< 200 ft), Champaign Co.
Arsenic in Mahomet Aquifer, Champaign Co.
Arsenic vs. Well Depth

The graph illustrates the relationship between arsenic concentration (As) in water samples and well depth. The x-axis represents the arsenic concentration (μg/L) ranging from 0 to 160, while the y-axis represents the well depth (ft) ranging from 0 to 200.

The data points are categorized into two groups: Samples (black dots) and GWQDB (red dots). The blue vertical line indicates the standard depth limit for well installations.

The distribution of data points suggests a trend where arsenic concentration increases with increasing well depth.
Geological Formations in Tolono Area

SW

Horizontal scale: 1 inch = 2,000 feet
Vertical scale: 1 inch = 100 feet
Vertical exaggeration: 20X

NE

Compiled by Andrew Stumpf
Quaternary Geology Section, Illinois State Geological Survey

- Wisconsin Till
- Upper Glasford Fm.
- Vandalia Till
- Pearl Fm.
Where is the Arsenic Coming From?

- Canada!
  - Glaciers ground up rocks and transported them to the U.S. Midwest
  - Arsenic from Canadian rocks ended up in aquifer sediments deposited when the glaciers retreated
How Does Arsenic Get into the Water?

- Arsenic probably associated with iron oxide minerals, which are abundant in sediments.
- Under certain natural conditions, iron oxides dissolved and arsenic released.
- Under other conditions, arsenic can be removed from the water by various geochemical reactions.
What Can I Do?

- Because the Glasford and Pearl Aquifers are so discontinuous, drilling a new well may not be possible
  - Shallow bored wells do not have arsenic, but they have other problems
- Treat the water
- Drink/cook with bottled water
ILLINOIS DEPARTMENT OF PUBLIC HEALTH
WELL CONSTRUCTION REPORT

1. Type of Well
   Curb material ________ Buried slab: Yes __ No __
   b. Driven _____ Drive pipe diam: 4 in. Depth 119 1/2 ft.
   c. Drilled _____ Finished in Drift _____ In Rock ______
   Tubular __ Gravel packed ______
   d. Grout: ______

2. Distance to Nearest:
   Building: 28 ft. Seepage Tile Field ______
   Cess pool: ________ Sewer (non cast iron) ________
   Privy ________ Sewer (cast iron) ______
   Septic Tank _____ Barnyard ________
   Lecching pit: ________ Manure Pile ______

3. Is water from this well to be used for human consumption?
   Yes _____ No ____________ Date completed: 6-22-73

4. Permanent Pump Installed? Yes _____ No _____
   Manufacturer: Red Jacket ___ Type: submersible 1/2 HP
   Capacity: 10 gpm. Depth of setting: 105 ft.

5. Well Top Sealed? Yes _____ No ______

6. Pitless Adaptor Installed? Yes _____ No ______

7. Well Disinfected? Yes _____ No ______

8. Water Sample Submitted? Yes 1972 No ______

9. Remarks:
   No drawdown available as well was developed by air
   Serial No.: DHZ 2368
   Well, 12 cycle, 1 phase
   230 volt, 60 cycle, 1 phase
   IDPH: 4065
   10-72 KNE-1
   Fittings at top: lead packed
   Fittings at bottom: 3-way ball fitting

GEOLOGICAL AND WATER SURVEYS WELL RECORD

10. Property owner: Robert Ruster ________ Well No. 1
    Address: 704 S. Race St. Urbana, Il. 61801
    Driller: Sims Eaton Drilling Co. License No. 92-151

11. Permit No. FE-17205 Date: 6-22-73
12. Water from: sand ________ County: Champaign

13. Formation at depth: 123 1/2 ft.
14. Screen: Diam. 4 in. Twp. 18N

15. Casing and Liner Pipe
   Diem (in.) Kind and Weight From (Flt) To (Flt)
   4 11 lb. drive 0 119 1/2

16. Size Hole below casing: none ______

17. Static level 54 1/2 ft. below casing top which is 1 ft.

18. FORMATIONS PASSED THROUGH
   Thickness Depth from bottom
   Topsoil 1 1
   Yellow gravelly clay 10 11
   Blue " w/boulders 51 62
   Sandy blue clay 51 113
   Fine clean sand w/h 9 122
   Slightly coarse, fine clean 5 127 1/2
   Sand, w/h ______
   Clay ______

(continue on separate sheet if necessary)

SIGNED: ________ DATE: 6-22-73

By: __________ Signature: ________
GEOLGICAL AND WATER SURVEYS WELL RECORD

10. Property owner: David Meller
   Well No.: 1
   Address: 748 Scoville Urbana, IL
   Driller: Sims-Baton Drilling
   License No.: 102-172
   Permit No.: 30425
   Date: 6-11-74
   Water from: sand
   Formation: at depth 164 to 175 ft.
   Sec.: 10
   Twp.: 17N
   Rge.: 8S
   Elev.: 725

15. Casing and Liner Pipe: 1 1/4 in.
   Length: 11 ft.
   Slot: 14
   Rge.: 8S
   Elev.: 725

11. Property owner: David Meller
   Well No.: 1
   Address: 748 Scoville Urbana, IL
   Driller: Sims-Baton Drilling
   License No.: 102-172
   Permit No.: 30425
   Date: 6-11-74
   Water from: sand
   Formation: at depth 164 to 175 ft.
   Sec.: 10
   Twp.: 17N
   Rge.: 8S
   Elev.: 725

16. Size Hole below casing: none

17. Static level: 23 1/2 ft. below casing top which is 20 1/2 ft. above ground level. Pumping level: 15 ft. when pumping at 15 gpm for 1 hour.

18. FORMATIONS PASSED THROUGH

<table>
<thead>
<tr>
<th>Formation</th>
<th>Thickness</th>
<th>Depth of Bottom</th>
</tr>
</thead>
<tbody>
<tr>
<td>topsoil</td>
<td>11</td>
<td>2 1/2</td>
</tr>
<tr>
<td>yellow gravelly clay</td>
<td>11</td>
<td>12</td>
</tr>
<tr>
<td>blue gravelly clay</td>
<td>47</td>
<td>59</td>
</tr>
<tr>
<td>sandy blue clay</td>
<td>29</td>
<td>88</td>
</tr>
<tr>
<td>compact blue clay</td>
<td>76</td>
<td>164</td>
</tr>
<tr>
<td>coarse dirty sand/ w/b</td>
<td>11</td>
<td>175</td>
</tr>
</tbody>
</table>

(CONTINUE ON SEPARATE SHEET IF NECESSARY)

SIGNED: Rosalind M. Sowers
DATE: 11/24/74