Photo Summary
Remediation of Shallow Wells

From a Power Point presentation to the
Annual Conference of the Groundwater Foundation.
November 4, 2004, Washington, D.C.

Thousands of rural Americans get their drinking water from wells that look like this:

Many families are drinking
out of a

sanitation nightmare.

It is common practice for families
to drink the water
just like it comes from the well—
without disinfection, treatment,
filtration, or testing.

The challenge now
is to see if thousands of rural
wells can be upgraded to prevent contamination.

Preservation of this water source in a sanitary fashion is important to our area.

Best estimates:
3,486 homes in Lancaster and Northumberland Counties of Virginia have water that is drawn from inadequately constructed wells.

Shallow wells are in use in many parts of the United States and in developing countries.

Because shallow wells are fed by rain and snow, this is a **renewable** source of water

In a country with national standards
for safe drinking water,
there is a huge gap
in public health and safety

because private wells
are not regulated after
their initial installation
and many homeowners
are woefully uneducated
as to proper maintenance.

Shallow Well Studies in Virginia

Curran Study. In 1995, Lancaster County
44 wells sampled 13 (30 percent) were positive for *E. coli* bacteria

duPont Survey. In 2003, Northumberland County
90 percent of the wells (34 of 38) had **detectable levels of total coliform bacteria**.
16 wells (42 percent) had detectable levels of E. *coli* bacteria.

Nitrate was present in 31 of the 40 wells at a concentration that could cause health problems for infants.

Kingston Study. In 1994, Northumberland County.
8 wells—all wells failed total *coliform* screening,
but none showed detectable levels of E. *coli* bacteria.

Watchdog Study. Included virus screening of water samples by Michigan State University. Twelve wells were sampled initially and 8 were sampled a second time. The university identified **4 wells of great concern for potential public health risk** and advised alternative sources of water, boiling the well water, or installation of treatment systems.

Well head Protection

New Wells

In Virginia well drillers are required to install a protective **grout (cement) down 20 feet** for shallow bored wells.

Many **older shallow wells** have **no protective** sealing or grouting.

Remediation is done by hand.

Three case studies

Well A.  Hand grouted in 1994.

Although nothing was done to the well in 2003 and 2004, laboratory analyses varied dramatically:

	Total coliform	E. coli
June 2003	579	48
Feb. 2004	131	-0-
July 2004	1046	11
Sept. 2004	-0-	-0-
Oct. 2004	2419	-0-

Well B.  The owner has thrown a board over the top. Laboratory reports show no E. coli and only 81 MPN/100 ml for total coliform bacteria.

Well C.

Laboratory analyses showed total coliform bacteria count as > 2,419 MPN/100ml and E. coli 32.8 MPN/100 ml.

Possible sources of contamination include:

Unsealed pipes in the well about 20 feet from the highway drain ditch which the dog uses for a swimming pool.

Any consideration of remediation for a shallow well should include a

thorough assessment

of social and environmental factors,
laboratory analyses,
and inspection of the well structure
to determine sources of contamination and
pathways and entry points into the well.

Laboratory analyses of follow-up samples
are a necessity.

Common Pathways of Contamination

Sampling errors

The plumber and the Plumbing

Chlorinate anytime
the source or system
is opened for remodeling or repair.

Everything on a plumber's shoes
goes down the well with him.

The waterline from the well

When the pipeline is installed, plumbers break a hole through the cement curb often leaving a jagged opening around the pipe where dirt can pour into the well.

Inadequate disinfection.

We arrived at a well site just as the crew was chlorinating and noticed that the man **was splashing most of the liquid bleach around the sides of the well**. Very little got into the well water and the water level never came up to the area that had been bleached.

Homeowners in the country
are very reluctant to use bleach
lest their well water taste like city water.

They may only use a teacup of bleach for 20 feet of well water.

Home heating oil tanks

When a home heating oil tank leaks, the ground around the well becomes saturated with the oil. Often the only solution is to **abandon the well and dig a deep well that does not draw from the surficial aquifer.**

A slow leak in the oil line under a neighbor's home gradually soaked the ground and made its way into a well.

A jar of water from the well with the kerosene rising to the top.

Summary

Thousands of rural citizens are currently outside the protection of our National Drinking Water Standards.

- At this point there is a great need for research to document whether commonly used methods for remediation of shallow wells are adequate to insure a safe supply of drinking water.
- Research is needed to verify the safety of drinking water in new shallow wells dug with modern specifications.
- A protocol for thorough assessment of environmental factors in addition to well construction problems is crucial.
- Focus must be placed on plumbing as a source of bacterial growth.
- Sampling techniques must be carefully scrutinized and documented.

- There is a vast need for public education in maintenance of water wells.

- Information on sanitation procedures for wells needs to be disseminated to plumbers, persons who “clean” wells, certification boards for well drillers, health department sanitarians and other water professionals as well as homeowners.

  A reliable method of withdrawing water from the surficial aquifer would preserve a valuable and renewable source of water.

The SAIF Water Committee
P.O. Box 839, Burgess, Virginia 22432
804 580-2079 www.saifwater.org saif@crosslink.net