SOUTH PLAINS
GROUNDWATER NEWS

FEBRUARY 2003 VOLUME 10, NUMBER 2

2002 District Sampling Program Completed

During the summer and fall of 2002, the District collected water samples from approximately 100 water wells. 86 of these were also sampled during 2001. The remainder of the 97 wells sampled during 2001 were inaccessible for varying reasons.

The District's management plan includes a strong emphasis on water quality monitoring. Conductivity and chlorides are the two parameters which are sampled most frequently. There are several reasons why these two are analyzed. First, the District's lab contains equipment that easily and quickly provides results for conductivity and chlorides. Secondly, conductivity and chlorides are general indicators of whether or not water is suitable for irrigation. Most water quality publications list both conductivity and chloride values at which yield reduction may occur for specific crops. The conductivity of water is a measure of the ability of water to conduct an electrical current. Therefore, as the amount of dissolved minerals increases, the higher the conductivity.

Most water quality publications list 2100 µS/cm as the conductivity limit at which yield reduction may occur in peanuts. The corresponding limit for cotton is 5100 µS/cm. Critical chloride values for peanuts are likely 450-600 ppm, while cotton is 710 ppm. Thus, peanuts require water of better quality than cotton.

The following table contains the number of wells which tested greater than or equal to 2100 µS/cm and greater than or equal to 5100 µS/cm for the years 2001 and 2002.

	> 2100	**> 5100**
# wells in 2001	33	3
# wells in 2002	33	4

The values shown in this table indicate no sharp changes in groundwater conductivity from 2001 to 2002. Another way of analyzing the results produces a similar perspective. The following table presents a comparison of conductivity values from 2001and 2002.

	2002 vs. 2001
# wells higher	39
# wells lower	39
# wells same	8

So, as an example, in 2002 there were 39 wells with a higher conductivity than in 2001. Also, there were 39 wells with a lower conductivity than in 2001.

Changes or variations in quality are often quite difficult to explain. Keep in mind that the conductivity is a measure of the dissolved minerals in water. Hence, as water levels decline, conductivity does not necessarily increase, i.e. more minerals may not always be dissolved. However, as water levels in the Ogallala decline, it may be possible that poorer quality water from the underlying aquifer may move more easily into the Ogallala formation. Also, as groundwater moves through the formation, it may come in contact with more minerals, which could increase the dissolved minerals. This scenario may be prevalent in areas where a man-made contamination continues to degrade water quality as water moves through it.

The water quality maps from 1998, 2001 and 2002 exhibit those areas of possible water quality concern for both peanuts and cotton. The areas shaded yellow indicate groundwater conductivity of greater than or equal to 2100 µS/cm. The red shading indicates groundwater conductivity of greater than or equal to 5100 µS/cm. The following table lists the approximate acres included in each of these two categories for each year.

Year	**Acres where cond. > 2100**	**Acres where cond. > 5100**
1998	236,433	20,559
2001	215,224	18,089
2002	233,346	21,987

Sampling...continued on page 3

USGS Releases Water Quality Analyses

During August 2001, the USGS performed an extensive water quality analysis for three Terry County well owners. This scientific study was performed as part of the National Water Quality Assessment (NAWQA) program for the Southern High Plains region. The entire High Plains NAWQA study covers 8 states overlying the High Plains Aquifer. The South Plains UWCD cooperated with USGS hydrologist, Lynne Fahlquist, to locate suitable domestic wells within three specified areas of the District. These three wells are located in the northwest, northeast , and south central portions of the District. Domestic wells were sampled because groundwater from these wells generally represents what people drink.

More than 200 parameters were analyzed during this study, providing the well owners a tremendous amount of information. In fact, such a comprehensive analysis would probably cost more than $2,000. In the report, these parameters form seven different groups . A brief description of those groups is as follows:

- **Physical parameters**--this group includes the water temperature, pH, conductance, alkalinity and others measured when the sample was taken.
- **Major ions**--fluoride, chloride and sulfate are several of the 11 major ions which were analyzed.
- **Nutrients**--this group contains an analysis of nitrate, phosphorus and other nitrogen compounds.
- **Trace elements**--these elements occur naturally in water and can be increased by human activities. Several trace elements analyzed include arsenic, chromium, iron, uranium and zinc.
- **Pesticides**--approximately 105 pesticide and pesticide metabolites were analyzed. Diazinon, malathion, atrazine and trifluralin are examples of the pesticides which were included.
- **Volatile Organic Compounds**--VOCs are a group of hydrocarbons that have a high solubility in water and may be resistant to degradation. Man-made VOCs are by-products or components of fuels, motor oil, paints, glues and many other materials. Acetone, benzene, MTBE and toluene are examples of VOCs analyzed. Some VOCs found in groundwater wells may be attributed to formation of by-products from disinfection.
- **Radioisotopes**--these radioactive parameters include radon and tritium.

The analyses provide a summary of the quality of water before any treatment devices. Such devices may include reverse osmosis or carbon filtration. The goal of the study was to characterize water quality straight from the aquifer. The analyses contain concentrations for each of the parameters previously mentioned. However, understanding why some things were detected is often quite challenging. The geochemistry of the Ogallala is diverse, and some constituents may be detected as a result of natural occurrences. While the analyses are exhaustive, several key findings include:

- Two of the wells sampled had fluoride concentrations greater than 4 mg/L, which is the maximum contaminant level (MCL) established by the US EPA primary drinking water standards. Fluoride concentrations often exceed 4 mg/L in the Southern High Plains.
- None of the three wells had nitrate levels that exceed EPA's MCL of 10 mg/L (as nitrogen).
- Two of the three wells sampled had arsenic concentrations greater than 10 µg/L. During 2002, the EPA lowered the MCL for arsenic from 50 µg/L to 10 µg/L. None of the three wells tested higher than 50 µg/L.
- Nearly all pesticides and VOCs were detected in the parts per trillion range, often below detection for EPA analytical methods. Deethylatrazine (a metabolite of atrazine) was detected at a very, very low concentration (much less than a part per billion) in one well. Atrazine and deethylatrazine are two of the most frequently detected pesticides in groundwater across the country, regardless of landscape.

The results of this study indicate no serious water quality problems from the three wells. Protection of groundwater quality is a goal of the SPUWCD, and an issue that is not taken lightly. The well owners and the District appreciate the information provided from this study.

A complete list of EPA's primary drinking water standards may be viewed by following the Frequently Asked Questions link on the District's web site (www.spuwcd.org).

GROUNDWATER PROTECTION

A drought produces increasing awareness of the quantity of water available for our needs. These needs may include drinking water, irrigation, household needs, or others. Similarly, an illness, newspaper article, or other factors may produce an increased awareness of the quality of water available for our needs. However, above all other needs, the quality of our drinking water is top priority. While quality is important for both rural and city residents, a rural well owner may not afford the level of water treatment often available for public water supplies.

Fortunately, most areas of the District have no major water quality problems that cause severe health effects. However, there is no guarantee that problems will not arise, especially if groundwater protection is overlooked.

Groundwater protection often includes some very simple steps that, if practiced, greatly reduce the risk of contamination. The District is charged with the preservation of our groundwater quality, and actively works with well owners to correct violations that may affect groundwater quality. Some common problems that may pose a threat to groundwater quality include improper well construction, open or uncovered wells, and deteriorated wells.

Improper well construction/ maintenance issues are evident in both new and old wells. Older wells, however, may have problems that are more expensive to fix. The following list contains reminders of proper construction and maintenance practices:

1) Well casing must be cemented to a depth of not less than 10 feet below land surface.
2) Plastic casings must either have a slab poured or have a steel sleeve installed to a depth of at least 12 inches.
3) Wells located in flood prone areas must include a watertight sanitary well seal.
4) Pumps must be installed so that the casing is completely covered.

During the past year, the District has discovered eight open or uncovered wells. These wells provide a conduit for anything to enter the aquifer. Rodents, snakes, bees and other animals may be found in these cases. Also, uncovered or open wells may allow ag chemicals to contaminate our groundwater. Even open wells in CRP lands and dryland may be at risk, and should not be overlooked. District rules and State law require that an unused well have a pump properly installed, or be capped. An approved cap is one that is not easily removed and is capable of withstanding at least 400 pounds of weight.

Deteriorated wells are most often older wells, or are newer wells that were completed improperly. Often, these wells pose a very great danger and the loss of the well is imminent. In some cases, the extent of deterioration extends 6-10 feet or more beyond the well bore. In these cases, considerable expense is involved to either repair or plug the well. The key to prevention here is regular inspection and maintenance. The primary causes of deteriorated water wells are neglect and erosion. The erosional process may begin with burrowing rodents, and then worsen after a heavy rain. Tall weeds growing around wells may hide a small problem that worsens quickly.

Other tips for protecting groundwater quality include:

1) Be sure that check valves are installed and properly closing. State law requires quick-closing check valves where any chemical is injected.
2) Do not store chemicals near wells where spills may occur. Atrazine detections in public water supply wells near Plainview may have been caused by spills near water wells.
3) If you fill water and chemical tanks from irrigation wells, be sure the supply line is downstream of your check valve. This prevents accidental contamination which can occur from siphoning.

Remember, it is your responsibility as a well owner to make sure your wells are properly maintained and covered. The next time you drink from a well, stop and make sure you are following these tips so that drink will remain a good one.

Sampling...from page 1

Now, changing sampling locations and/or adding sampling points may affect the extent of water quality concern as depicted in these maps. The District's goal is to sample approximately 100 wells that are evenly distributed across the area, thus representing an accurate assessment of overall groundwater quality.

The 1998, 2001 and 2002 water quality maps are available at the District office, and may be viewed or printed from the district's web site at www.spuwcd.org.

Meter Repair Set for February

A representative from Great Plains meter will be in the District office on February 26-27, 2003. At this time, he will be available to repair any flow meters that were purchased from Great Plains Meter.

Most meter problems should be fixed quite easily. If, for some reason a meter needs additional work, it may be sent for repairs at that time.

If you have a meter that needs repair, please call or come by the District office.

SOUTH PLAINS GROUNDWATER NEWS is published by the SOUTH PLAINS UNDERGROUND WATER CONSERVATION DISTRICT, PO Box 986, 802 Tahoka Road, Brownfield, TX 79316. Directors: Dan Day, Matt Hogue, Scott Hamm, Doyle Moss, Larry Yowell; General Manager: Jason Coleman; Administrative Assistant: Lindy Harris. Subscriptions are free upon request.

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Calendar of Events

Feb. 17	*Presidents' Day Holiday Office Closed*
Feb. 26-27	*Great Plains Meter representative in office*
March 4	*Board Meeting 8:30 am District office*
April 8	*Board Meeting 8:30 am District office*
April 18	*Good Friday Office Closed*
May 6	*Board Meeting 8:30 am District office*
May 26	*Memorial Day Holiday Office Closed*

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In this issue…

- *Groundwater Protection*
- *Meter Repair Set for February*
- *USGS Releases Water Quality Analyses*
- *2002 District Sampling Program Completed*