Capital Area Ground Water Conservation Commission

Watching out for **A T**reasured **E**arth **R**esource

Dedicated to the conservation, orderly development and protection of quality of ground water in the Capital Area

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Commission & District News

Scheduled Meetings. – The Technical Committee will meet at 1:30 p.m. Tuesday, March 11, 2008 in the conference room of the U.S. Geological Survey at 3535 South Sherwood Forest Boulevard, Baton Rouge, Louisiana. The regular meeting of the Board of Commissioners will be held at 9:30 a.m., Tuesday, March 18, 2008 in the conference room of the U.S. Geological Survey. The Administrative Committee will meet at 8:30 a.m. in the Commission office, Suite 129, 3535 South Sherwood Forest Boulevard, one hour before the regular meeting.

December Meetings. – The Technical Committee met at 1:30 p.m., Tuesday, December 4, 2007, at 3535 South Sherwood Forest Blvd., Suite 129, Baton Rouge, Louisiana.

Mike Simms, URS Corporation, gave a presentation on the ground-water modeling study at the Georgia-Pacific plant at Port Hudson. The model consists of six layers extending to a depth of about 800 feet. (See diagram)

The modeling study consists of several steps. First, a data base was collected of the hydrogeology of the aquifers in the area of study. This consists of well logs, water levels in the sand units, hydraulic characteristics and aquifer testing. This information is then fed into the MODFLOW model. The grid size in the mill area was 100x100 feet increasing to 500 feet squares at the boundaries. Simulations of the model were run to match the historical data. Also, the effect of the Mississippi River alluvial aquifer on the aquifers were studied. Cross sections across the valley indicate the upper and middle and lower sands have hydraulic connection to the alluvial aquifer. The modeling study evaluated the hydraulic impacts of several new production well locations in the middle and lower sands within the Georgia-Pacific property.

A brief presentation of the USGS modeling study of the “2,000-foot” sand was given by John Lovelace and Dan Tomaszewski. Quarterly progress reports on the study will be given at the Commission’s Technical meetings. Chuck Haywood of Colorado has been hired to head up the modeling effort and will be assisted by the Baton Rouge USGS office.

Layer	Unit	Depth	Baton Rouge Aquifer
1	Prairie Terrace		
2	Upper Sand	130-195	“400-ft” sand
3	Middle Sand	205-260	“400-ft” sand
4	Lower Sand	320-410	“600-ft” sand
5	G-P “500-ft” sand	440-520	“800-ft” sand
6	G-P “700-ft” sand	650-790	“1,000/1,200-ft” sand

Organic Contaminants

Organic contaminants comprise a diverse group of carbon compounds that affect water quality and public health. Carbon's unique chemical makeup allows it to combine with various other elements to form a multitude of organic chemicals. These include the open-chain or "aliphatic" and ring or "aromatic" compounds.

Organic compounds exist both as naturally occurring and man-made occurrences. The contaminants of most concern in drinking water are man-made. The list is lengthy and includes pesticides, herbicides, petrochemicals, benzene, disinfection by-products and persistent chemicals including pharmaceuticals, DDT and PCB (polychlorinated biphenyls), to name a few. Pharmaceuticals are a special problem because they end up in the wastewater stream and eventually, out in the environment. It is a simple matter to flush them down the toilet.

The long term effect of pharmaceuticals and personal care products is not well known. A Wisconsin scientist reported that hormones such as estrogen may have a significant effect on aquatic organisms. More research is needed on the fate and transport of these chemicals. Wastewater reclamation in the western states is used to recharge aquifers and augment the local ground-water supply. If the pharmaceuticals and other persistent chemicals are not screened out, there is the potential for them to enter the public drinking water supplies.

Naturally occurring organic compounds include tannins and lignins produced by vegetation decomposition and compounds secreted by algae and bacteria in water. The total organic carbon (TOC) is the sum of all the carbon, both natural and man-made. Purification of water by chlorination may cause the formation of chlorinated hydrocarbons, for example trihalomethanes or haloacetic acids. Because these compounds may have adverse health effects, maximum contaminant levels are regulated by EPA, and public water suppliers are required to give an annual report to consumers on water quality. The table below shows the maximum contaminant level (MCL) of some common organic chemicals. Baton Rouge Water Company's 2006 report to consumers reported both trihalomethanes and haloacetic acids as "not detected". This is a testimony to the good quality of ground water in the Capital Area District.

Organic Compound	Maximum Contaminant Level (micrograms per liter)
Trihalomethanes (sum of 4)	80 mg/L (running annual average)
Haloacetic acids (sum of 5)	60 mg/L (running annual average)
Atrazine	3 mg/L (varies by state)
Benzene	5 mg/L (varies by state)

Well Rehabilitation

Most of the wells drilled for industrial and public supply use are tested at completion to determine the aquifer properties and well capacity. The well owner should keep a historical record of the well's performance over time. A simple and reliable way of checking wells is to monitor their specific capacity at certain intervals of time, say semiannually or annually. Specific capacity is defined as the well's output in gallons per minute for each foot of drawdown. For example, let's say a new well is pumping at 1,200 gallons per minute (gpm) and the drawdown (difference between static water level and pumping level) is 60 feet. The specific capacity of the well is 1,200 divided by 60 or 20 gpm per foot of drawdown.

Over a period of time if the specific capacity declines to 18 or 16 gpm/foot of drawdown, some type of rehabilitation may be necessary to maintain the long-term performance and extend the well life. A rule of thumb is to perform some type of well maintenance if the specific capacity declines by 10 percent. Like changing oil in a car, well maintenance extends the well life and results in lower operational costs. The AWWA Journal Opflow (October 2007) lists three categories of primary well rehabilitation.

- Chemical – acids, bases, dispersants, antibacterial agents
- Mechanical – surging, brushing, jetting, freezing
- Impulse Generation – detonation cord, impulse generators

Impulse generation is a process where a compressed gas is released under high pressure. The generator is equipped with a valved system to release the energy in short bursts into the screened interval. The energy vibrates the well screen and formation material and loosens plugged sediment and biological deposits around the screen. In Germany, research has been conducted to compare the various well rehabilitation techniques. They found that the impulse generation was the most effective technology concerning penetration depth and energy measured outside the well screen.

Impulse generators can be used in various well types including vertical or horizontal stainless steel screens, perforated or slotted casing and open-hole wells. According to Opflow

(October, 2007) the advantages of this technology are

- ❖ Its wide range of applications
- ❖ Its effectiveness
- ❖ The powerful impulse applied simultaneously throughout the well screen provides good coverage
- ❖ Fast, cost-efficient operation
- ❖ No harmful side effects; no by-products

Not only is the impulse generation effective in rehabilitation, but for new well development. A city in Idaho drilled a 24-inch well with a discharge of 2,400 gpm. However, the pumping rate declined to 1,600 gpm over a short time, and it was determined that initial well development was inadequate. Redevelopment with the aid of impulse generation was successful in removing sediment outside the well screen. An impulse generator setup is shown in the photo below.

Reports

Griffith, J.M., 2007, Fluoride concentrations in freshwater aquifers in Louisiana, 1931-2006: Louisiana Department of Transportation and Development Technical Report No. 77.

Prakken, L.B., 2007, Chloride concentrations in the southern Hills regional aquifer system in Livingston, southern Tangipahoa, and St. Tammany Parishes, Louisiana, 2005: Louisiana Department of Transportation and Development Technical Report No. 76.

Sargent, B.P., 2007, Water use in Louisiana, 2005: Louisiana Department of Transportation and Development water Resources Special Report No. 16.

U.S. Geological Survey, 2002, Pharmaceuticals, hormones, and other organic wastewater contaminants in U.S. Streams, USGS Fact Sheet FS-027-02.

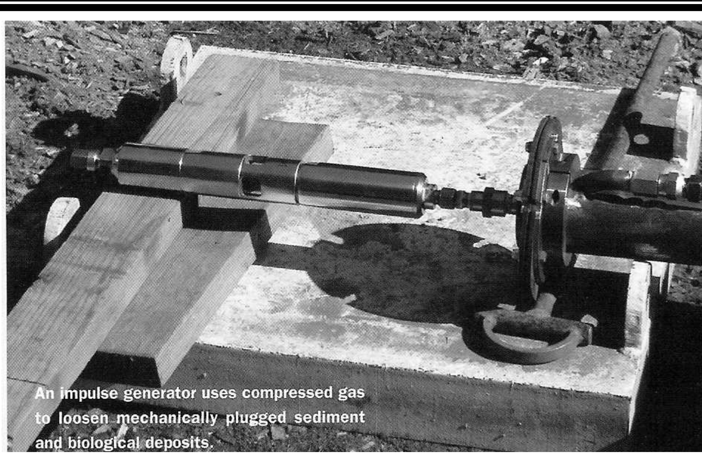
Lovelace, J.K., 2007, Chloride concentrations in ground water in East and West Baton Rouge Parishes, Louisiana, 2005-05, USGS Scientific Investigations Report 2007-5069. (in press)

Fluoride Report

A report on the fluoride concentrations in the aquifers of Louisiana has been published. (See Reports). Fluoride at the proper level of concentration (0.8 to 1.2 milligrams per liter) is beneficial in preventing tooth decay. However, too much fluoride is undesirable and causes tooth mottling. In general, this is not a problem in Louisiana's ground water, but some wells in Avoyelles Parish screened in Pliocene and Miocene sands have shown fluoride concentrations several times the optimum level.

Aquifers in the Capital Area District are, for the most part, below the optimum recommended level in fluoride concentration. A summary table in the report shows the following results.

Aquifer	Median Concentration in mg/L
Chicot equivalent Upland Terrace "400-foot" "600-foot"	0.2
Evangeline equivalent "800 thru 1,700-foot"	0.2
Jasper equivalent "2,000 thru 2,800-foot"	0.3



An impulse generator uses compressed gas to loosen mechanically plugged sediment and biological deposits.

Water rights have been fought over since ancient times. Abraham successfully dug wells to water his herds. Canaanite tribesmen under Abimelech seized the well from Abraham's herdsmen and he entered into a covenant with Abimelech (Genesis 21:27) to reclaim the well. His son, Isaac, continued to dig wells in the family tradition, but continued to struggle with the Philistines over the wells (Genesis 26:19-22).