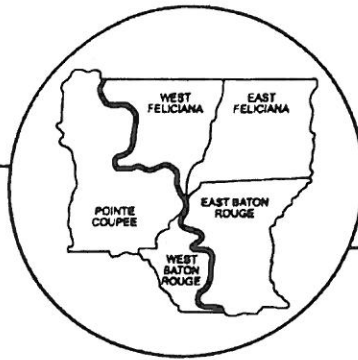


CAPITAL AREA GROUND WATER



CONSERVATION COMMISSION

3535 S. Sherwood Forest Blvd., Suite 129
Baton Rouge, Louisiana 70816-2255
Telephone (225) 293-7370

December 13, 2011

James H. Welsh
Commissioner of Conservation
Louisiana Department of Natural Resources
P.O. Box 94275
Baton Rouge, Louisiana 70804-9275

Re: East Baton Rouge Parish Metropolitan Council Resolution # 48944

Dear Commissioner Welsh:

The Capital Area Groundwater Conservation Commission (CAGWCC) has received your request for a summary of current and future plans approved (by CAGWCC) or under consideration to address saltwater encroachment through the Baton Rouge Fault and towards the location of public supply wells used to provide drinking water to residents of East Baton Rouge. We respectfully offer the following.

The CAGWCC was created by Act 678 in the 1974 Regular Session of the Louisiana Legislature and can be found at La. R.S. 38:3071 (et. Seq.), and became effective on January 1, 1975. The Capital Area includes the parishes of East Baton Rouge, West Baton Rouge, East Feliciana, West Feliciana and Pointe Coupee. The Commission consists of fifteen members, one member from each of the parishes composing the district, three members representing the industrial users in the district, three members representing private or public water supply for rural, or municipal use in the district with the condition that at least one of said three members shall always be from the nominees of privately owned users furnishing a municipal water supply, one member representing the office of public works of the Louisiana Department of Transportation and Development, one member representing the Louisiana Farm Bureau Federation and the Louisiana Cattlemen's Association, one member representing the Louisiana Department of Environmental Quality, and one member being the nominee of the board.

As early as the 1930's, it was realized that water levels in Baton Rouge's city supply wells were dropping. The Louisiana Legislature established a Louisiana Water Resources Study Commission around 1936, but they met only a few times and did not take much action.

In 1964, a USGS report titled "Salt Water Encroachment in Aquifers of the Baton Rouge Area" was published, in conjunction with the Louisiana Office of Public Works, recommending a drilling and monitoring program be implemented. Later that year, a water commission was proposed to Mayor Woodrow Dumas by Leo Bankston and others. East Baton Rouge Resolution 53:24 established a special Water Conservation Commission to study groundwater conditions, with particular interest in saltwater encroachment, and to make recommendations for remedial action.

In 1965, the Louisiana Water Resources Research Institute proposed a study of possible solutions to the saltwater encroachment threat.

In 1970, a legislative act (No. 682) allowed establishment of the Greater Baton Rouge Water Conservation District (RS 38:3051) and a twenty member Board of Commissioners was appointed to administer District affairs. This Commission gathered enough information to determine the need for control legislation. Proposed legislation was presented to the Louisiana Legislature, but failed to pass.

In 1974, a similar bill was introduced that expanded the District to include the five parishes in the capital area (East Baton Rouge, West Baton Rouge, East Feliciana, West Feliciana and Pointe Coupee). The bill passed (No. 678), creating the Capital Area Groundwater Conservation District (RS 38:3071) and a Board of Commissioners to administer the affairs of the District. An organizational meeting was held on January 14, 1975.

Since its creation, the Capital Area Groundwater Conservation District has been involved in the efficient administration, conservation, orderly development and supplementation of groundwater resources in the five-parish area. The CAGWCC has driven investigative efforts and policy changes and fostered an atmosphere of cooperation to promote the responsible development of the groundwater resources in the Baton Rouge area and to protect the quality of these resources. Numerous actions (see Attachment 1) have been taken by the Commission to study, assess and address the matters of subsidence, salt water encroachment and water level decline in the district.

Saltwater intrusion into the "1500-foot" and "2000-foot" sands has been specifically addressed by the CAGWCC. These actions include studies, models and mitigation. A

"connector-well" to recharge the "1500-foot" sand and create a pressure barrier was placed in operation in 1999, resulting in partial mitigation of saltwater movement toward the Baton Rouge Water Company's (BRWC) "1500-foot" wells at their Government Street pumping station.

Recently, it was decided that additional information was needed for water planners and managers in the Baton Rouge area to make decisions on future management of groundwater resources in the area. In 2007, CAGWCC, in cooperation with the United States Geological Survey, Louisiana Water Resources Science Center (USGS), the Water Resources section of the Department of Transportation and Development (LaDOTD) and the City of Baton Rouge and Parish of East Baton Rouge Department of Public Works began a study to develop a regional ground-water flow and solute-transport model of the Southern Hills Regional Aquifer System in the Baton Rouge area to simulate past, current, and a variety of possible future conditions in the "2,000-foot" sand. Results of this study will be published in a report that will be publicly available after October, 2012. A summary appearing on the USGS Louisiana Water Science Center web site states:

"Saltwater encroachment has been detected in six aquifers, including the "1,500-foot" and "2,000-foot" sands, north of the Baton Rouge fault in East Baton Rouge Parish. The encroachment is in response to ground-water withdrawals, primarily for public supply and industrial uses, in Baton Rouge. Additional information is needed for water planners and managers in the Baton Rouge area to make decisions on future management of ground-water resources in the area. The impact of the pumping wells on ground-water flow and the northward encroachment of saltwater is not well known. The time and route for saltwater to travel from the fault to pumping centers is not known. Water managers and planners need this information to help them determine possible locations for additional water-supply wells, saltwater scavenger wells, injection wells, or observation wells. A computer model is being created to simulate past, current, and a variety of possible future conditions in the "1,500-foot" and "2,000-foot" sands. The completed model will provide a tool to help water planners and managers evaluate possible management alternatives, and increase the understanding of saltwater movement in aquifers in similar hydrogeologic settings. The work is being conducted with funding from the Capital Area Ground Water Conservation Commission, the

Louisiana Department of Transportation and Development, City of Baton Rouge and Parish of East Baton Rouge, and the U.S. Geological Survey.”

This report will provide information about the impact of pumping wells on the “1,500-foot” and “2,000-ft” sands, and on the time and route for saltwater to travel northward from the fault to pumping centers in the “2,000-foot” sand. The resulting model will provide a tool to help evaluate possible saltwater-encroachment mitigation plans including assessing the need for and possible locations of additional pumping wells, injection wells, or observation wells. The model also will provide a base for future additional cooperative studies in which CAGWCC can evaluate ground-water flow and saltwater encroachment in other sands in the Southern Hills Aquifer System.

CAGWCC, in cooperation with the USGS, the LaDOTD, the Louisiana Geological Survey and other concerned parties, routinely conducts cooperative water-resource investigations. For example, recent studies in the Baton Rouge area show and assess aquifer potentiometric surfaces (Tomaszewski and Accardo, 2004; etc.), the location and structure of various aquifers (Griffith, 2006; etc.), or model groundwater flow in local aquifers (Torak and Whiteman, 1982; etc.). Many of the reports that resulted from these studies are listed in the selected references at the end of Attachment 1.

Also, CAGWCC and the USGS cooperatively maintain water-level, chloride-concentration, and subsidence well networks. The 2011 water-level network includes 77 wells in East and West Baton Rouge, Pointe Coupee, and East and West Feliciana Parishes that are measured quarterly. Water-level data at three of those wells are measured hourly by real-time gauge and can be viewed at a USGS web site. The 2011 chloride-concentration network includes 41 wells in East and West Baton Rouge Parishes that are measured annually or semi-annually. The subsidence well network includes three wells at the Baton Rouge Exxon refinery that are used to measure relative compaction of sub-surface strata.

The BRWC and the CAGWCC jointly funded a study by Dr. Frank Tsai entitled *Scavenger Well Operation Model to Assist BRWC to Identify Cost-Effective Approaches to Stop Saltwater Intrusion toward the BRWC Water Wells in the “1,500-Foot” Sand of the Baton Rouge Area*. This study was completed in 2011. Scavenger wells are a way to remediate the intrusion of saltwater into an aquifer. This study was designed to determine the feasibility of this remediation method and to select the location for the scavenger wells to prevent/reduce the saltwater impact on the BRWC’s Lula pumping station.

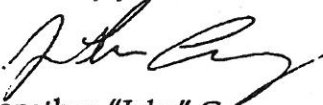
Results of the activities of CAGWCC (including basic data collection and scientific investigations and discussions) have lead to policy changes designed to protect the

groundwater resources in the Baton Rouge area, and have been used by major water users, planners, and managers to change withdrawal plans to help protect the groundwater resources in the Baton Rouge area.

Should you determine that hearings are required, we would request to be a participant in conjunction with the Office of Conservation in those hearings.

If you have any other questions concerning the activities of the Capital Area Groundwater Conservation District and Commission, please do not hesitate to contact the District Director, Mr. Anthony J. Duplechin, at (225) 293-7370.

Sincerely yours,

A handwritten signature in black ink, appearing to read 'Jonathan Causey', written in a cursive style.

Jonathan "Jake" Causey
Chairman

Attachment 1

**List of Relevant Actions by the
Capitol Area Ground Water Conservation Commission (CAGWCC)**

<u>Date</u>	<u>Action</u>
11/17/1975	Requested industry to reserve the "1,000-", 1,500-", and "1,700-foot" sands for public supply wells
7/18/1988	Re-affirmed above resolution and called attention to the fact that the "1,500-foot" sand south of the Baton Rouge fault in West Baton Rouge Parish is included
10/15/1991	<p>Adopted the following conservation policy for the "2,000-foot" sand in the Baton Rouge area. The policy would apply to the area bounded by Chippewa Street, the Mississippi River, Irene Road-Heck Young Road extended east, and Plank Road.</p> <ol style="list-style-type: none">1. Requested a moratorium on installation of new industrial wells in the "2,000-foot" sand in the area defined above, except for replacement wells or as approved by the CAGWCC.2. Established a limit for the annual pumping rate in the "2,000-foot" sand in the area defined above of 26 million gallons per day.3. Proposed a maximum water level for the "2,000-foot" sand in the defined area of 320 feet below land surface.4. Encouraged development of alternate aquifers or surface water sources as sources of supply.5. Encouraged use of shallow aquifers or the Mississippi River for cooling water and deeper aquifers for process, boiler feed and drinking water.
4/21/1992	CAGWCC advised Senator John Breaux on the saltwater problems in Baton Rouge and the CAGWCC's concerns for protecting the area water supply and requesting funding support for planning and implementing remedial measures.
7/21/1992	Passed a resolution accepting, in principle, Baton Rouge Water Company's proposed construction and lease back of saltwater remediation facilities; also authorized the District Director to send a letter to all pumpage users informing them of the details of the proposed remediation project.

Attachment 1

- 10/20/1992 Authorized the CAGWCC to proceed with the Baton Rouge Water Company (BRWC) proposal, when approved, to install 1-3 scavenger wells in the "2,000-foot" sand. (This project was cancelled due to insufficient funding).
- 6/21/1994 District Director briefed CAGWCC on proposal to obtain EPA grant under Section 319(h) of the Clean Water Act aimed at controlling saltwater encroachment using the recharge effect of connector wells.
- 1/14/1998 Successful bid for connector well construction received.
- 4/6/1999 Connector well placed in operation.
- 12/16/1999 CAGWCC received National Ground Water Association's 1999 Outstanding Ground Water Project Commendation for connector well project.
- 6/18/2002 Technical Committee asks the CAGWCC to consider alternative water sources and recommended a feasibility study be undertaken to document the potential costs versus benefits.
- 12/10/2002 CAGWCC approved proposal by URS Corporation to conduct a feasibility study for alternative water supply sources, with funding to be split 50/50 between CAGWCC and East Baton Rouge Parish.
- 12/9/2003 URS Corporation reports to CAGWCC results of study for alternative water supply sources for industrial users, stating that the use of reclaimed treated effluent is technically feasible, but would require economic and financial incentives, or strong political and legislative initiatives.
- 3/16/2004 CAGWCC approved URS study.
- 3/20/2007 CAGWCC approved moving forward with US Geological Survey project entitled "Movement of Saltwater in the "2,000-foot" Sand in the Baton Rouge Area, Louisiana" to be funded by joint CAGWCC-Baton Rouge City Parish and CAGWCC-USGS contracts.
- 6/15/2010 CAGWCC approved entering into an agreement with BRWC to fund research by Dr. Frank Tsai entitled "Scavenger Well Operation Model to Assist BRWC to Identify Cost-Effective Approaches to Stop Saltwater Intrusion toward the BRWC Water Wells in the "1,500-foot" Sand of the Baton Rouge Area."
- 6/21/2011 Commission approved sending a Letter of Recommendation to the Louisiana Board of Regents for proposed study by Drs. Frank Tsai and

Attachment 1

Jeff Hanor of "Unconventional Hydraulic Control Deep-Aquifer Saltwater Intrusion Mitigation Under Uncertainty", in which they will study the feasibility of using horizontal wells as saltwater scavenger wells.

Electronic copies of the following reports, which were funded and published by the CAGWCC, are included with this response:

Capital Area Groundwater Conservation District Bulletin #1

Saltwater-freshwater interfaces in the "2,000-" and "2,800-foot" sands in the Capital Area Ground Water Conservation District, Charles G. Smith, 1976, 23 p.

This study was undertaken to determine the origin and potential effect of saltwater north of the Baton Rouge fault. These two sands are important aquifers for the Baton Rouge area. In 1976, the average daily pumpage from the "2,000-foot" sand was 36 million gallons per day and from the "2,800-foot" sand 23 million gallons per day.

Capital Area Groundwater Conservation District Bulletin #2

Subsidence in the Capital Area Ground Water Conservation District, Charles G. Smith and Raphael G. Kazmann, 1978, 31 p.

An update of cumulative subsidence in the Baton Rouge area. Leveling profiles across the area were made, and subsidence from earlier levels from the year 1934 – 1964 was added to the additional subsidence calculated from 1964 to 1976. Maximum subsidence was about 1.2 feet in the industrial area south of the intersection of Airline Highway and Scenic Highway.

Capital Area Groundwater Conservation District Bulletin #3

A geohydrologic survey of the "1,200-foot" sand in the Capital Area Ground Water Conservation District, Charles G. Smith, 1979, 19 p.

Investigates the "1,200-foot" sand in the vicinity of the Baton Rouge fault. The study was oriented to map the relation between the sand and the fault, to evaluate conditions in the sand and discuss areas of potential ground-water quality changes due to saltwater encroachment.

Capital Area Groundwater Conservation District Bulletin #4

Status of saltwater encroachment in the "600-foot" sand of the Baton Rouge area, 1999, George T. Cardwell and Don C. Dial, 17 p.

An update of the area affected by saltwater encroachment and evaluation of the adequacy of the chloride monitoring network in the "600-foot" sand. Included also was an evaluation of the

Attachment 1

possible connection between the "600-foot" and "800-foot" sands. This question was crucial to the proposal to construct a connector well between the "800-foot" and "1,500-foot" sands.

Capital Area Groundwater Conservation District Bulletin #5

A connector well to protect water-supply wells in the "1,500-foot" sand of the Baton Rouge, Louisiana area from saltwater encroachment, 1999, Don C. Dial and George T. Cardwell, 17 p.

This report is the result of a ground-water remediation project supported by a grant under section 319(h) of the Clean Water Act. A large-diameter well was constructed to connect the "800-foot" and "1,500-foot" sands. The purpose was to raise the water level and divert northward saltwater movement in the "1,500-foot" sand away from public-supply wells at Government Street. Constant recharge of the "1,500-foot" sand by the "800-foot" sand is driven by a head difference of 80 to 90 feet between the two sands.

Three wells, EB-1274 (screened in the "800-foot" sand), EB-917 (screened in the "1,500-foot" sand) and EB-1293 (the connector well that connects the two sands) are constantly monitored with a satellite hookup at the well sites.

URS Final Report

"Feasibility Study for Alternative Water Supply for Industrial Users".

Dr. Frank Tsai's Final Report

"Scavenger Well Operation Model to Assist BRWC to Identify Cost-Effective Approaches to Stop Saltwater Intrusion toward the BRWC Water Wells in the "1,500-foot" Sand of the Baton Rouge Area."

Louisiana Board of Regents Proposal

"Scavenger Well Operation Model to Assist BRWC to Identify Cost-Effective Approaches to Stop Saltwater Intrusion toward the BRWC Water Wells in the "1,500-foot" Sand of the Baton Rouge Area."

The following reports resulted from cooperative investigations between CAGWCC and other state and Federal agencies:

Griffith, J.M., 2006, Hydrogeologic maps and sections of the "400-foot," "600-foot," and "800-foot" sands of the Baton Rouge area and adjacent aquifers in East and West Baton Rouge, East and West Feliciana, and Pointe Coupee Parishes, Louisiana: U.S. Geological Survey Scientific Investigations Report 2006-5072, 15 p., 13 pl.

Attachment 1

- Griffith, J.M., and Lovelace, J.K., 2003, Louisiana ground-water map no. 15: Potentiometric surface of the "1,200-foot" sand of the Baton Rouge area, Louisiana, spring 2001: U.S. Geological Survey Water-Resources Investigations Report 03-4020, 2 sheets.
- Griffith, J.M., and Lovelace, J.K., 2003, Louisiana ground-water map no. 16: Potentiometric surface of the "1,500-foot" sand of the Baton Rouge area, Louisiana, spring 2001: U.S. Geological Survey Water-Resources Investigations Report 03-4021, 2 sheets.
- Halford, K.J., and Lovelace, J.K., 1994, Analysis of ground-water flow in the "1,200-foot" aquifer, Baton Rouge area, Louisiana: Louisiana Department of Transportation and Development Water Resources Technical Report no. 54, 68 p.
- Huntzinger, T.L., Whiteman, C.D., Jr., and Knochenmus, D.D., 1985, Simulation of ground-water movement in the "1,500- and 1,700-foot" aquifer of the Baton Rouge area, Louisiana: Louisiana Department of Transportation and Development, Office of Public Works Water Resources Technical Report no. 34, 52 p.
- Kuniansky, E.L., 1989, Geohydrology and simulation of ground-water flow in the "400-foot," "600-foot," and adjacent aquifers, Baton Rouge area, Louisiana: Louisiana Department of Transportation and Development Water Resources Technical Report no. 49, 90 p.
- Kuniansky, E.L., Dial, D.C., and Trudeau, D.A., 1989, Maps of the "400-foot," "600-foot," and adjacent aquifers and confining beds, Baton Rouge area, Louisiana: Louisiana Department of Transportation and Development Water Resources Technical Report no. 48, 16 p.
- Lovelace, J.K., 2007, Chloride concentrations in ground water in East and West Baton Rouge Parishes, Louisiana, 2004–05: U.S. Geological Survey Scientific Investigations Report 2007–5069, 27 p.
- Tomaszewski, D.J., 1996, Distribution and movement of saltwater in aquifers in the Baton Rouge area, Louisiana, 1990–92: Louisiana Department of Transportation and Development Water Resources Technical Report no. 59, 44 p.
- Tomaszewski, D.J., 1998, Hydrogeology and the effects of pumpage on the "1,500-foot" sand south of the Baton Rouge fault, near Brusly, Louisiana, 1996: Louisiana Department of Transportation and Development Water Resources Technical Report no. 65, 22 p.
- Tomaszewski, D.J., and Accardo, Darren, 2004, Louisiana Ground-water map no. 19: Potentiometric surface of the "2,400-foot" sand of the Baton Rouge area, Louisiana, May-June 2002, U.S. Geological Survey Scientific Investigations Map 2865, 2 sheets.

Attachment 1

Tomaszewski, D.J., and Accardo, Darren, 2004, Louisiana Ground-water map no. 20: Potentiometric surface of the "2,000-foot" sand of the Baton Rouge area, Louisiana, May 2002, U.S. Geological Survey Scientific Investigations Map 2872, 2 sheets.

Tomaszewski, D.J., and Anderson, M.L., 1995, Data from wells in a chloride monitoring network, Baton Rouge area, Louisiana, 1965-94: Louisiana Department of Transportation and Development Water Resources Basic Records Report no. 19, 40 p.

Torak, L.J., and Whiteman, C.D., Jr., 1982, Applications of digital modeling for evaluating the ground-water resources of the "2,000-foot" sand of the Baton Rouge area, Louisiana: Louisiana Department of Transportation and Development, Office of Public Works Water Resources Technical Report no. 27, 87 p.

Whiteman, C.D., Jr., 1979, Saltwater encroachment in the "600-foot" and "1,500-foot" sands of the Baton Rouge area, Louisiana, 1966-78, including a discussion of saltwater in other sands: Louisiana Department of Transportation and Development, Office of Public Works Water Resources Technical Report no. 19, 49 p.

Whiteman, C.D., Jr., 1980, Measuring local subsidence with extensometers in the Baton Rouge area, Louisiana, 1975-79: Louisiana Department of Transportation and Development, Office of Public Works Water Resources Technical Report no. 20, 18 p.