Water takes a long journey

By DAVID KERESTER
Tribune Chronicle

CORTLAND — Shortly after David Brown became Superintendent of Public Services for the city of Cortland, he heard an amazing story: Some of the water in the city's deep, underground aquifer originally came from as far away as Lake Ontario, Canada.

Its slow, underground flow through rock, clay and various pathways, he was told, took some 2,000 years to reach its ultimate destination: The faucets of Cortland residents. If this were true, it would mean some of the water Cortland residents drink each day last saw the surface of the earth around the time of Christ.

Even Brown, who has overseen the city's water department since 1981, could not discount the tale. The city's 15 trillion-gallon aquifer is so deep underground, its water so pure and so readilly available yet inexplicably replenished, anything seemed possible, he thought.

Adding fuel to the speculation, Brown said while the many layers of soil, clay, shale and rock above the aquifer have resulted in the purest of water, it nonetheless contains a high amount of sodium. So high, Brown has cautioned residents with high blood pressure and other sodium-related risk-factors.

There are no known sodium deposits near the Cortland area or the aquifer's known sources, says Brown. The nearest sizeable deposits are found along Lake Erie in Cleveland.

"I've wondered if that's not the source of the sodium," Brown said.

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In 1997, the U.S. Geological Survey released its report of the aquifer following an extensive five-year study. The report details every known factor of the Cuusewego Sandstone aquifer that begins 175 feet below the city and runs 310 feet beneath the surface. The aquifer extends west underground and northwest of Mosquito Creek Reservoir and southeast into Bazetta.

Considered the most complete and accurate portrait of the city's water supply and its sources ever made, the study could not account for 15 to 20 percent of the 600,000 gallons apparently replenished each day after pumped from the city's six wells for residents' use.

Geologist Gary J. Barton, primary author of the study, suggests Mosquito Creek Reservoir as the principal source for the immense aquifer's water, but his study concludes that water seeping through to the aquifer below requires 60 to 110 years due to the soils and nonporous sediments under the lake. Mosquito's annual recharge to the aquifer is unknown, but measurements suggest the lake and overall surface area above the aquifer contribute less than half of its annual intake, Barton concludes.

Two smaller underground formations that collect and distribute water are also minor contributors to the aquifer's replenishment, the study found. Together, the Berea Sandstone and Bedford Shale may contribute 70 million gallons of water per year to the Cortland water supply, about 35 percent of its recharge.

One expert, however, suspects the 15 to 20 percent of unaccounted recharge to the aquifer comes not from Canada or Cleveland, but also from Mosquito Creek Lake.

Greg Gough, senior geologist with Moody and Associates of Meadville, Pa., has studied the Cussewego system of sandstone rock that runs north as far as upstate New York and Canada. It is impossible, he says, for water to travel underground to Cortland through the Cussewego sandstone even from as near away as Meadville, he said.

"It would run into the Shenango River watershed, which would capture it," he said.

Gough, whose company drills water wells in four states and conducts studies of water systems, suggests that while Barton's study is thorough, their measurements may not have accounted for changes along the lake bottom.

"I would say the recharge from the lake is higher than presumed," Gough said. "You could have areas beneath the lake where glaciers cut through the sandstone giving a higher rate of recharge than measurements estimated," he said.

Barton states in his study that no geological data are available for mapping the Cussewego Sandstone subcrop beneath the lake, supporting Gough's premise. The salt, says Gough, may come as a result of the water retaining the sodium found naturally in small quantities in the rock and shale that the water has dissolved along its journey, he said. A lesser possibility would be brine runoff from oil or gas drilling nearby, he said.

Gough's explanations, he agreed, remain only theories, at least until further studies are done.

Whatever its sources, some facts about Cortland's water supply are certain. Its purity, for one. Tests of the water consistently show no traceable amounts of tritium. Tritium is found in all area water that was above ground when atmospheric tests of nuclear wapons were conducted in the 1950s. The absence of tritium means all of the water in Cortland's acquifer, including the water that is replenished daily, has taken very long to get there — a minimum of 60 years, according to Barton.

Also absent is bacteria. Brown says the chlorine added to the city's water, used to kill bacteria commonly found in most water supplies, has never been shown to be necessary. Even in the event of bacteria forming in the city's above-ground pipes, Brown said he thinks Cortland has never needed the minimum amounts of chlorine the EPA mandates.

One other certainty exists, Brown said. There is enough water in the aquifer to last a very long time.