The Texas Water Quality Inventory – Groundwater Assessment

AKA: The “305(b)” Report

Abiy Berehe, P. G.

Texas Commission on Environmental Quality
• In 2003, groundwater provided 57 percent of the 16.2 million acre-feet
• Farmers used about 79 percent of this groundwater
• Municipalities relied on groundwater for about 36 percent of their water supplies
The Water Quality Inventory data depends heavily on

• the ambient water quality data from the TWDB

• but also incorporates some data from TCEQ’s Public Drinking Water program and other sources
Aquifers

Major Aquifers of Texas

Minor Aquifers
We will begin in aquifers underlying the High Plains of Texas, Ogallala Aquifer and will generally move South from there …
Nitrate is a constituent of concern for the Ogallala aquifer.
Newborn and nursing infants exposed to high nitrates in drinking water may develop methemoglobinemia, or “blue baby syndrome.”
• A special study on Nitrate loading to Texas aquifers was completed in 2007

• The study was done by the Bureau of Economic Geology, Jackson School of Geosciences, University of Texas at Austin
Arsenic is also present at concentrations of concern in the Ogallala aquifer.
Arsenic has been linked to cancer of the bladder, lungs, skin, kidney, nasal passages, liver, and prostate.
Non-cancer effects from arsenic can include thickening and discoloration of the skin, stomach pain, nausea, numbness in extremities, partial paralysis and blindness.
Exposure to levels of fluoride above the primary MCL of 4 mg/l may result in bone disease. Levels above 2 mg/l may result in staining or pitting of teeth.
The Dockum aquifer generally underlies the Ogallala. It has some issues with nitrate as well.
Nitrates are a concern in Seymour Aquifer.
A similar situation exists with the Blaine aquifer.
The Cenozoic Pecos Alluvium aquifer is classified as a major aquifer. It has some pretty major issues with nitrate...
... and total dissolved solids. Total dissolved solids (TDS) is referred to by EPA as a nuisance constituent.
High TDS concentrations are not considered a health risk, however, hardness, chemical deposits, staining and salty taste are all usability issues.
High chloride concentrations, which are not a health risk, but again goes toward usability of the resource, are an issue in the Cenozoic Pecos Alluvium, . . .
as are sulfates.
Nitrate is again a constituent of concern for the Edwards-Trinity (Plateau) aquifer.
The Lipan aquifer, near San Angelo, has high nitrate concentrations. The red dots indicate nitrate values greater than 10 mg/l.
Here too, TDS . . .

... and chlorides are concerns.
The Hueco-Mesilla Bolsons supply water to El Paso, Texas, and Ciudad Juarez, in the Mexican state of Chihuahua. Nitrates are a concern here.
Groundwater becomes increasingly saline with depth in the Hueco Bolson, so TDS and chlorides are also concerns here.
The Trinity aquifer supplies water to a large area in the middle of Texas. Nitrates are a concern for this aquifer.
TDS is also an issue in the Trinity aquifer. There is no apparent pattern to the distribution of TDS concentrations.
The Hickory aquifer is unusually shaped, due to the uplift of pre-Cambrian rocks in the Llano area. Nitrate is a particular concern for the Hickory aquifer.
TDS is the main concern in the Sparta aquifer.
The Yegua-Jackson aquifer is the most recently designated minor aquifer. TDS values are a concern in the aquifer . . .
... as are chlorides.
... as are sulfates
The Yegua-Jackson aquifer has some high concentrations of the dissolved element manganese.
There is no published health-effect level for Manganese. Another “nuisance” constituent, its presence can cause discoloration, turbidity and formation of a black precipitant.
As with the Yegua-Jackson aquifer, the adjacent Gulf Coast aquifer has some high concentrations of manganese.
The distribution of iron concentrations in the Gulf Coast aquifer is similar to that of manganese. Iron isn’t considered a health risk either, but water with high concentrations will have a dark color.
In the Rio Grande Valley/Winter Garden area, nitrate is a significant concern.
The same area has high concentrations of arsenic. Some deeper portions of the aquifer, further up the coast, have high arsenic concentrations as well.
Chlorides are yet another concern in the Gulf Coast aquifer.
There are some constituents that have an effect statewide. One of these is radionuclides.
The highest Gross Alpha particle activity are present in the Hickory, Ellenberger-San Saba aquifers.
Boron is another statewide concern.
There will also likely be some additional information from special studies in the future similar to the nitrate or arsenic studies.
Thank You.

For more information, Contact
Groundwater Planning and Assessment Team
Water Supply Division
Texas Commission on Environmental Quality
Tel. (512) 239-5480