GMDA NEWS

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Annual Conference 2004

The GMDA Annual Conference will be held in Tampa, Florida in early January 2004. The exact location and date will be announced at a later date. One of the main topics for the Conference will focus on desalinization plants in the Sunshine State and its applications for coastal cities. Jim Reasoner of the Central Colorado Conservancy District, who is also Vice President of GMDA, will be organizing the Conference.

SUBSIDENCE
Land Subsidence & Groundwater Pumping

by S. A. Leake
courtesy U.S. Geological Survey Web Site

Land subsidence is the lowering of the land-surface elevation from changes that take place underground. Common causes of land subsidence from human activity are pumping water, oil, and gas from underground reservoirs; dissolution of limestone aquifers (sinkholes); collapse of underground mines; drainage of organic soils; and initial wetting of dry soils (hydrocompaction). Land subsidence occurs in nearly every state of the United States.

Overdrafting of aquifers is the major cause of subsidence in the southwestern United States, and as groundwater pumping increases, land subsidence also will increase. In many aquifers, ground water is pumped from pore spaces between grains of sand and gravel. If an aquifer has beds of clay or silt within or next to it, the lowered water pressure in the sand and gravel causes slow drainage of water from the clay and silt beds. The reduced water pressure is a loss of support for the clay

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S.R. Anderson/U.S. Geological Survey

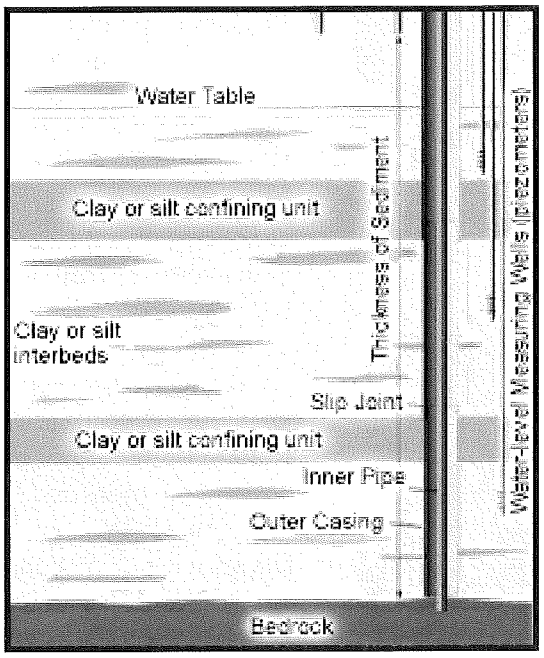
Sign warning motorists of subsidence hazard was erected after an earth fissure damaged Snyder Hill Road in Pima County, Arizona, 1981.

Land Subsidence *cont'd from Page 1*

and silt beds. Because these beds are compressible, they compact (become thinner), and the effects are seen as a lowering of the land surface. The lowering of land surface elevation from this process is permanent. For example, if lowered groundwater levels caused land subsidence, recharging the aquifer until ground water returned to the original levels would not result in an appreciable recovery of the land-surface elevation.

In many areas of the arid Southwest, earth fissures are associated with land subsidence. Earth fissures can be more than 100 feet deep and several hundred feet in length. One extraordinary fissure in central Arizona is 10 miles long. These features start out as narrow cracks, an inch or less in width. They intercept surface drainage and can erode to widths of tens of feet at the surface.

Several methods are available to monitor land subsidence. The most basic approaches use repeated surveys with conventional or GPS leveling. Another approach is to use permanent compaction recorders, or vertical extensometers. These devices use a pipe or a cable inside a well casing. The pipe inside the casing extends from land surface to some depth through compressible sediments. A table at land surface holds instruments that monitor change in distance between the top of the pipe and the table. If the inner pipe and casing go through the entire thickness of compressible sediments, then the device measures actual land subsidence. If both groundwater levels and compaction of sediments are measured, then the data can be analyzed to determine properties that can be used to predict future subsidence. About 19 of these installations are operated in Southern Arizona and additional stations are operated in California, Nevada, New Mexico, and Texas. Another subsidence monitoring method under development and testing uses Interferometric Synthetic Aperture Radar (INSAR). With this method, individual radar images from satellites are compared and interferograms are produced. Under the best conditions, land-surface elevation changes on the order of 1 inch or less can be determined.



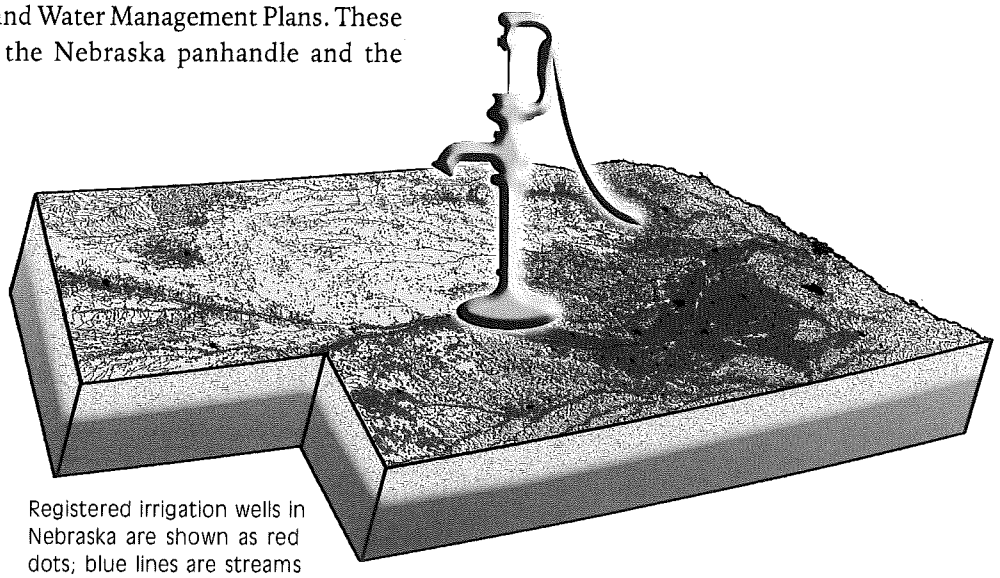
Drought Leads to Record Drilling in Nebraska

The long lasting drought and moratoriums for new wells in several western Nebraska Natural Resources Districts (NRD's) has lead to a flurry of drilling activity in central and eastern Nebraska. The Nebraska Department of Natural Resources reports that in 1999, 720 new irrigation wells were drilled in the State, which increased to 1,001 in 2000. The big jump was in 2002 when 1,564 new irrigation wells were drilled and 2003 will likely top even this number.

Due to the drought and heavy ground water pumping, in some areas of western Nebraska streams are drying up and surface water irrigators are not getting their full allotment of water even though their surface water right may be much olden than any well constructed in the area. While other Western States have faced this same problem for decades, this is one of the few times this has happened in Nebraska. To address this, six NRDs have installed well moratoriums to conserve water and to allow themselves time to study and installed Integrated Surface and Ground Water Management Plans. These Districts are in the Nebraska panhandle and the Republican River Basin in southwest and southcentral Nebraska.

Other NRD's have seen a sharp increase in the number of new well permit applications for irrigation wells. Central Platte NRD in Grand Island issued 250 permits in 2002 and already in the first four months of this year they have received 100 new applications. The Upper Big Blue NRD based in York issued 111 permits for 2002 but has already received 95 new applications. Other NRD's in central and eastern Nebraska have noted a similar trend.

Nebraska is one of the most heavily irrigated States in the US and most of that is based on ground water due to the abundant aquifers. However, the resource is not infinite and if this drought continues, more areas of the State may see well moratoriums. Of course, this is what irrigators are concerned about and even with a depressed farm economy, landowners want to get those wells in while they still can.



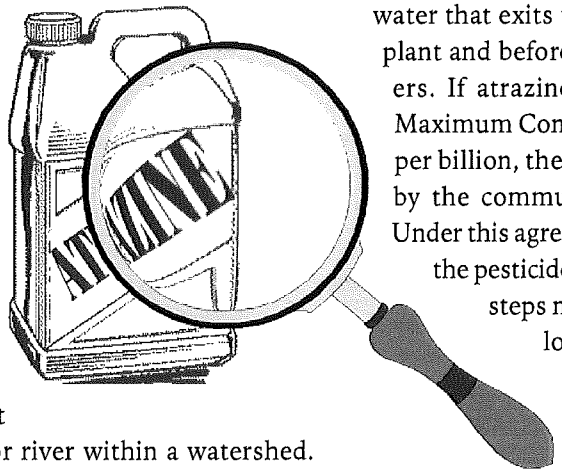
Registered irrigation wells in Nebraska are shown as red dots; blue lines are streams and rivers.

Atrazine Use Under Review

from: EPA National News Web Site

Atrazine is probably the most heavily used herbicide in the United States. First registered in 1958, it is used today on corn, sugarcane and even residential lawns.

In order to protect vulnerable community drinking water supplies, the Environmental Protection Agency (EPA) on January 31, 2003 has adopted more aggressive measures to control the presence of atrazine in the "raw" water used by these communities. Raw water refers to the water source just before it enters a community drinking water treatment plant, which in most cases will be a stream or river within a watershed. The principal maker of atrazine is Syngenta, and under an agreement with EPA, Syngenta will monitor atrazine in vulnerable watersheds on a weekly basis during certain times of the year. If the safety standards are exceeded in the raw drinking water, then the use of atrazine in that watershed could be canceled.



The Safe Drinking Water Act already requires communities to test for atrazine in their "finish" water that exits the community water treatment plant and before it is delivered to their customers. If atrazine concentrations approach the Maximum Contaminant Level (MCL) of 3 parts per billion, then this triggers additional testing by the community and regulatory oversight. Under this agreement, if the MCL is violated then the pesticide manufacturer is required to take steps necessary to help that community lower that concentration so the community can return to compliance. The cost will be the responsibility of the atrazine manufactures.