Vulnerability of Ground Water to Contamination
Northern Bexar County, Texas

By A.R. Clark

USGS Water-Resources Investigations Report03-4072

ABSTRACT

The Trinity aquifer, composed of Lower Cretaceous carbonate rocks, largely controls the ground-water hydrology in the study area of northern Bexar County, Texas. Discharge from the Trinity aquifer recharges the down gradient, hydraulically connected Edwards aquifer—one of the most permeable and productive aquifers in the Nation and the sole source of water for more than a million people in south-central Texas.

The unconfined, karstic outcrop of the Edwards aquifer makes it particularly vulnerable to contamination resulting from urbanization that is spreading rapidly northward across an “environmentally sensitive” recharge zone of the Edwards aquifer and its up gradient “catchment area,” composed mostly of the less permeable Trinity aquifer.

A better understanding of the Trinity aquifer is needed to evaluate water-management decisions affecting the quality of water in both the Trinity and Edwards aquifers. A study was made, therefore, in cooperation with the San Antonio Water System to assess northern Bexar County’s vulnerability to ground-water contamination. The vulnerability of ground water to contamination in this area varies with the effects of five categories of natural features (hydrogeologic units, faults, caves and (or) sinkholes, slopes, and soils) that occur on the outcrop and in the shallow subcrop of the Glen Rose Limestone.

Where faults affect the rates of recharge or discharge or the patterns of ground-water flow in the Glen Rose Limestone, they likewise affect the risk of water-quality degradation. Caves and sinkholes generally increase the vulnerability of ground water to contamination, especially where their occurrences are concentrated. The slope of land surface can affect the vulnerability of ground water by controlling where and how long a potential contaminant remains on the surface. Disregarding the exception of steep slopes—which are assumed to have no soil cover—the greater the slope, the less the risk of ground-water contamination. Because most soils in the study area are uniformly thin, they have only minimal effect on the vulnerability of ground water to contamination.

The results of hydrogeologic mapping during the present study divide the outcrop of the Glen Rose Limestone into five mappable intervals, labeled (youngest to oldest) A through E. Of these intervals, only the middle (C) and the lowermost (E) generally provide appreciable permeability.

The vulnerability assessment provided herein was determined by combining the presumed effects of selected natural features (with individual vulnerability ratings ranging from 0 through 35) using a grid-based, multilayer system of digital datasets and geographic information system analysis. The resulting vulnerability map comprises composite vulnerability ratings that range from 26 through 104. The relatively less vulnerable areas—those containing no faults, sinkholes, or caves—occupy about 92 percent of the study area. The most vulnerable areas are those containing both a fault and one or more caves. The distribution of the most vulnerable areas—which trend from southwest to northeast, roughly parallel to the Balcones fault zone—occur mainly where faults intersect caves.

Cont’d on Page 7
August Meeting Details
Meetings of the San Antonio Chapter ABPA are usually held the second Thursday of every month. Dinner and refreshments are served at 6:00 p.m. sharp with the meeting at 6:30 p.m. The next meeting is:
Date: Thursday, August 14, 2003
Time: 5:00 p.m. - 9:00 p.m.
Location: Bexar Met Water District
           2047 W. Malone
Program: ACT SUPPLY
Meal: Provided by ACT SUPPLY
       No alcoholic beverages allowed by Bexar Met Water District policy

Proposed Meeting Agenda for August 14, 2003
4:45-5:15pm
Directors Meeting

5:15-6:00pm
Meal is served

6:00-6:30pm
Business Meeting
President Ron Renouf Presiding

Training Schedule
6:30-7:30pm
     Bill Hamrick: Auto-Brite
     2 hours: Backflow Testers License: Proposed changes for gauge callibration

7:30-8:00pm
     Chris Curry: J.C.M.
     Allen Hammer: A.C.T. Supply
     2 hours: Water Operators License: New sleeves and Custom Sleeves for Odd Diameter Pipe

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Backflow Happens
Ron Renouf, President, ABPA
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A recent article in the San Antonio Express News points out a new source of lead poisoning. The paper states: “Many common hoses are made with polyvinyl chloride, a material that contains lead as a stabilizer. That means that standing water in the hose may contain unacceptable levels of the heavy metal. Consumer Reports Magazine (www.consumerreports.com) warns that some hoses leached as much as 100 times the acceptable amount of lead.”

This is another reason why hosebib vacuum breakers are an important part of any cross connection control program. We know we are doing the right thing but this kind of information is very helpful in our quest to inform the general public of the necessity of backflow prevention assembly installation and testing. We don’t just do these things “because the Chief Plumbing Inspector says so!” Backflow happens!

FROM THE DESK OF ROBERT STRICKER
COSA CHIEF PLUMBING INSPECTOR

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You will not be receiving a receipt any longer; your canceled check & bank statement are your verification.

To all plumbing & irrigator contractors, please take advantage of the free training that we are offering on how to use the Dynamic Portal. This training will be very beneficial to you in order for you to take full advantage of the various things that you will be able to do on-line. While you are at it, please make sure that your contractor info is current and correct in our system. This is important so that you can get full benefit from the Dynamic Portal.

Thank you and keep up the good work. Most of you are really trying to do things right.

Robert

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Today is Yesterday’s Tomorrow

It is so easy to put things off until tomorrow. Especially when the matter to be taken care of inconveniences us just a little bit, and it usually does. Reason? Most of us do not like our routine disturbed in any way, shape or form; although what we are doing at the time may be something as simple as reading the morning paper. We attempt to attach more importance to what we are doing than to what should be done. Quite often, there is no harm done in postponing a disagreeable chore to the following dayÖweekÖmonth. Cleaning out the garage, washing the car, or raking leaves will perhaps create no greater problem tomorrow than it does today.

A room that needs painting will still need painting next month or next spring, and nothing really serious should develop through neglect. A soiled and unsightly room maybe, that’s all. Waiting until we are in the mood to do these certain things is all right unless the delay involves risk to our personal welfare or the welfare of someone else. Once safety becomes a factor, the delay involves

*at-risk behavior.* In accident prevention, that is not good. There are some people who never “*get in the mood*” to tackle routine-disturbing matters until an emergency arises. A wheel has finally dropped off the car, a loose window finally falls out of its frame, or a loose hammerhead flies off and injures someone or causes property damage. That when something gets repaired or replaced. The penalty for waiting however, can be very severeÖinjury and painÖor even death.

It must be agreed that everything does not have to be done on the spur or the moment. But the degree of urgency rates its priority relative to when it should be done. Loose shingles flopping on the rain soaked roof of your house during a storm may have to wait for more favorable weather before repairs can be made safely. However, a toilet not working properly could require immediate attention, especially if it is overflowing. The same line of thinking governs priority to conditions on our jobs. Example, faulty brakes or steering gear on a vehicle would get the nod for quick repair, certainly over a dented fender that could be repaired later. A windshield wiper blade may be replaced before a cracked window, etc. Safety establishes this priority. There is an individual responsibility we all must accept in evaluating items on our jobs. Point of concern at the time may be working conditions on the job, conditions and types of tools and equipment being used, methods being followed, and unusual hazards not part of the original job planning.

All these evaluations must be made as conditions present themselves or when they are called to our attention. For example, a chisel or bar with a mushroomed head must be repaired or replaced

today—not tomorrow. Loss of an eye could result from the delay. A defective jaw in a pipe wrench, a split handle of a sledge, undersized extension cord, and any other tool found to be unsafe should be taken out of service immediately and replaced with safe ones. Once you can visualize the potential danger of unsafe practices and unsafe equipment, the real message of accident prevention is hitting home. The next step is to evaluate priority rating of the things to be done Ö and then do them.

For many years safety engineers, experts, and other authorities have said that some people are “*accident-prone.*” By this, it is meant that certain people who often have accidents do so because of an inborn trait. Actually, relatively few people can be expected to have poor accident records year after year solely because of their personal nature. In other words, their behavior is at-risk not safe. However, there are a small number of people who are less able to avoid trouble because of mental or physical characteristics.

In safety, the so-called term “*Accident Proneness*” has no meaning and the term is often used as an excuse for lack of knowledge or skill in a particular operation or the failure to correct a safety hazard as soon as it is discovered. In other words, procrastination and at-risk-behavior takes priority. Sometimes an employee does not know the hazards of the task at hand and is ill prepared to avoid accidents. Being unsure of the proper use of a tool or the proper procedure on the job is not a good reason to go ahead and attempt to do the job. That’s at-risk behavior. Do the right thing and ask a question, that’s safe behavior.

Give safety the high priority it deserves and resolve to not put things off until tomorrow or start a task without knowing what is the safe way to complete it.

*Remember, today is yesterday’s tomorrow. Do it Now, Do it Right, Do it Safe.*
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No part of the vulnerability assessment offered herein should preclude or minimize the importance of detailed, on-site inspections by qualified hydrogeologists. The evolving understanding of the vulnerability of ground water to contamination in northern Bexar County will improve as additional data are collected and analyzed.

Descriptors:

*Ground water, Bexar County, Texas. A limited supply of the report is available for distribution. If you would like to receive a copy of the publication, please send a written request with your mailing label to District Chief, U.S. Geological Survey, 8027 Exchange Dr., Austin, TX 78754-4733. You also may e-mail your request to gs-w-txpublic-info@usgs.gov. Please include the report number with your request. Copies of the report also can be purchased from the U.S. Geological Survey (USGS), Information Services, Box 25286, Denver, CO 80225-0286, (303) 202-4210.

If you have any questions concerning the results of this investigation, please contact Amy Clark at (210) 691-9208. For information about other activities or programs of the USGS, please contact Jess Weaver at (512) 927-3500, or e-mail dc_tx@usgs.gov.
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