

The histogram and frequency table, on the previous page, were created from a survey of 176 EPA Class II injection projects approved during 1985 to 1998 for operations in Cooke County, Texas. A decision was made to create the histogram based on the number of wells plugged prior to 1967. The 1967 time period cutoff was chosen because TRRC plugging regulations and plugging enforcement became more stringent sometime after the 1967 to 1969 time period. The survey's 57.4 % represents 101 out of 176 injection projects that have 1/4 mile Areas of Reviews (AOR) with wells plugged prior to 1967. Pre-1967 plugged wells are classified herein as being unsafe or "improperly plugged." They are considered unsafe because they were plugged predominately with mud laden fluid, and are believed to have a high potential for fluid migration when exposed to the pressures from injection operations. Only when there is actual physical evidence that pre-1967 plugged wells will not be exposed to the pressures from injection operations, or have fluid cross flow from other formations, should they be considered safe.

The remaining 42.6 %, or 75 out of 176 injection projects in the survey, were considered safe. The "safe" term refers to injection projects **not** having wells plugged prior to 1967 within their 1/4 mile AOR. Boreholes plugged after 1967 might still be considered improperly plugged, because of their potential for fluid migration. Determination of whether or not plugged wells are improperly plugged, requires an engineering evaluation of plugging reports and reservoir data on a well by well basis. This survey did not perform engineering evaluations of each plugged well's potential for becoming a fluid migration conduit. Constraints of time, money and, scarcity of data and records, made engineering evaluations of each plugged well's fluid migration potential an impractical task. However, it is believed that nearly all pre-1967 plugged wells in the survey have the potential of becoming fluid migration conduits when exposed to the pressures from EPA Class II injection/disposal operations. And, it is believed that relatively few of the post-1967 plugged wells have the potential of becoming fluid migration conduits when exposed to the pressures from EPA Class II injection/disposal operations.

Oil field brine that migrates to fresh water aquifers from these injection/disposal projects will likely migrate down-dip from its point of entry in the aquifers. This down dip migration will be driven by gravity segregation, since brine is heavier than fresh water. Because of the brine migration, down dip communities that are pumping fresh water from the aquifer may experience an increase in water salinity in the deeper depths of the Antlers (and other aquifers) as time progresses. Communities pumping from the lowest point in the affected aquifers may experience the most damage to their fresh water supply because the migrating brine will eventually accumulate at the lowest points in the affected aquifers.

More information concerning the oil field brine migration problem can be seen on page 9 on my web site (<http://users2.ev1.net/~dbvoorhis/>). A copy of page 9 has been enclosed for your review. Page 9 illustrates how much fluid migration is possible from only **one** injection/disposal well. Areas that are most likely to have oil field brine migration problems in Texas are areas that have EPA Class II injection/disposal operations surrounded by wells plugged prior to 1967. Oil fields developed under "County Regular Field Rules" tend to have these characteristics. Texas oil fields in TRRC District 9, developed under County Regular Field Rules, are: Archer County Regular, Baylor County Regular, Clay County Regular, Cooke County Regular, Jack County Regular, Montague County Regular, Wichita County Regular, Wilbarger County Regular and Young County Regular. Other County Regular Fields may exist in other Districts, that are not mentioned here. All counties associated with the above fields are probably experiencing the same oil field brine migration/ fresh water pollution problem illustrated by page 9 of my web site.

As a licensed engineer in Texas, it is illegal to plan or implement projects that endanger public health, safety, welfare and property. Because of the potential for fluid migration to fresh water sands, it is illegal for engineers to plan or implement these type of EPA Class II injection/disposal projects. It is also illegal for others to implement these projects. Since EPA Class II injection/disposal projects affect public health, safety, welfare and property, they fall under the regulations outlined by the Texas Engineering Practice Act (TEPA). That is, they are considered **engineering** projects. The TEPA requires such projects and the engineering decisions and conclusions concerning the projects be performed by licensed, competent engineers. When things go wrong, as with the current Texas EPA Class II injection program, the Texas Board of Professional Engineers has the authority to investigate and, with the assistance of the Attorney General Office, correct the problems. This is a politically incorrect issue because many of the people and entities, that have received approval for these illegal projects, are not legally entitled to do so (law firms, geologists, landmen and other professionals not licensed as engineers). The Texas Engineering Practice Act makes it illegal for individuals to practice engineering without a license. The result of allowing anyone and everyone to practice engineering in the EPA Class II injection program, has been the endangerment of Texas ground water.

I have informed the authorities concerning these problems. An engineering complaint has been filed against the Texas Railroad Commission for incompetence in regards to their EPA Class II injection program. Several pages of correspondence and reports are on file with the Texas Engineering Board (& Attorney Generals Office), Travis County Public Integrity Unit, Texas Railroad Commission and the Region 6 EPA Office for Source Water Protection. It is my

opinion the state and EPA have dragged their feet concerning these problems because of what appears to be (or has been) their own mismanagement and incompetence. Both government entities seem to have taken a strategy of trying to find ways of not being held accountable for what has happened. And, they seem to have been busy trying to develop arguments that the applicable petroleum engineering science (all, or a portion thereof) is invalid.

It is my belief the state should have been getting opinions of petroleum engineering experts in underground injection and reservoir engineering on these problems, instead of using taxpayer money (& time) in finding ways to shift blame concerning these problems. The legal thing to do, according to the Texas Engineering Practice Act, would have been to consult engineering experts in these matters. Engineering experts in these issues are petroleum engineers that specialize in reservoir engineering and underground injection. I do not believe the state consulted petroleum engineering experts in these matters from either the University of Texas or Texas A&M University. The reason for this statement is that I have personally reviewed the EPA Class II injection program problems with several professors (experts) in the Petroleum Engineering Department at the University of Texas. I was told that they were not allowed to testify against the state on these types of issues (this conflicts with the Texas Engineering Practice Act). It is possible, that the current experts used by the state in these matters (engineers, geologists and bureaucrats at the Texas Railroad Commission), are the same experts that have had engineering complaints filed against them for incompetence.

Delays, lack of response and violations of the Texas Engineering Practice Act give me reason to believe the state and the EPA are guilty of fraud and deceit in regards to my efforts to correct the EPA Class II injection program problems, and in regards to protecting the public's fresh water rights. I think there has been fraud and deceit in that the state and the EPA have held themselves out as being experts at the science regarding the EPA Class II injection program problems, when the facts seem to show incompetence, mismanagement and obstruction of justice.

However, the state's (& EPA's) stance concerning some of these EPA Class II injection program problems seem to be changing. Some problems are being corrected. Their stance may change more rapidly if the entities affected, like the citizens of Cooke County, hold state officials accountable for what has happened and what is going on. Holding officials accountable might require lawsuits against the state from the entities (counties) affected.

I would greatly appreciate you keeping this letter, my name, the name of my company, address and telephone number confidential in regards to these matters. The main reason I would like to keep confidentiality is that several businesses in this state are making money from injection/disposal projects that are illegal from an engineering perspective (Texas Engineering Practice Act). Disclosure of my name as being the "poster boy" for promoting the correction of these problems will likely subject me to more harassment, threats and possible harm. Most individuals (including Austin attorneys) I have approached for help in these issues have taken a "hear no evil, see no evil and speak no evil" stance on these issues.

I am sending this same letter, with the page 9 enclosure, to the Nancy Williams (Gainesville City Attorney) and Ron Sellman (Gainesville City Utilities Director). I would greatly appreciate everyone receiving this package keeping my identity, business name, address and telephone number confidential.

Please contact me by telephone (512-261-3476) or by mail if you have questions. More documents and information are available.

Sincerely,

ORIGINAL SIGNED by David Voorhis

David B. Voorhis, Ph.D., P.E.
Owner

Enclosure - Copy of page 9 to my web site (<http://users2.ev1.net/~dbvoorhis>)