

j. Aquifer Protection, Aquifer Exemption.

## 1- Introduction

The purpose of EPA's UIC program is to protect underground sources of drinking water (USDWs) from the potentially harmful effects of the injection of fluids (Class II wells) for produced fluid disposal, enhanced recovery, and hydrocarbon storage.

EPA regulations define a USDW as "an 'aquifer' or its portion

- (a) (1) Which supplies drinking water for human consumption; or
- (2) In which the ground water contains fewer than 10,000 mg/l total dissolved solids, and
- (b) Which is not an exempted aquifer."

The regulations define an aquifer as "a geological formation, group of formations, or part of a formation that is capable of yielding a significant amount of water to a well or spring."

The regulations define an exempted aquifer as "an 'aquifer' or its portion that meets the criteria in the definition of underground source of drinking water but which has been exempted according to the procedures in § 122.35 (b)."

Under Section 1425 of the Act the State is not bound by, among others, Section 122.35 (b) of the regulations. Further, two Division studies attached as Appendix A-1 and A-2 demonstrate that the procedures of said section are not practical or economic.

However, under guidelines adopted by EPA for State Demonstrations, States are expected to be bound by the criteria of Section 146.04 of the regulations in exempting aquifers.

This section reads as follows relative to Class II wells:

§ 146.04 criteria for exempted aquifers

An aquifer or a portion thereof which meets the criteria for an "underground source of drinking water: in § 146.03 may be determined under 40 CFR 122.35 to be an "exempted aquifer" if it meets the following criteria:

- (a) It does not currently serve as a source of drinking water, and
- (b) It cannot now and will not in the future serve as a source of drinking water because;
  - (1) It is mineral, hydrocarbon or geothermal energy producing;
  - (2) It is situated at a depth or location which makes recovery of water for drinking water purposes economically or technologically impractical;
  - (3) It is so contaminated that it would be economically or technologically impractical to render that water fit for human consumption.

While it may be reasonable to describe and exempt aquifers in some areas such as that described in the Lea County report, Appendix A-2, such action is not uniformly needed nor is it practical. We believe it is possible to conduct a program for regulation of Class II injection wells which will, (1) protect underground sources of drinking water, and (2) not unnecessarily impede approval and use of such wells without formal aquifer designation or exemption. Nevertheless it remains the Division's intention to protect USDWs.

Prior to detailing the nature of the Division program which will accomplish the goals set out above, there should be some additional discussion as to the general impracticality and lack of necessity for aquifer exemption relative to Class II wells.

## 2 - Practicality

In addition to the gross economic impracticality conclusions inferred from the Eddy County report, Appendix A-1, the nature of

hydrocarbon reservoirs in a formation is such as to defy drawing a line on a map which once and for all may define the horizontal limits thereof. This commonly results from additional drilling which reveals edge wells, isolated pods of protection, or unsuspected pool extensions. Further completely new reservoirs in the same formation may be discovered in proximity to or somewhat removed from currently known reservoirs. These conditions are exemplified by figures A-1 and A-2 following and can be confirmed by comparing development maps from the 1940s and 50s to a recent map.

In essentially all cases one would expect that injection into such extended or new reservoirs would be necessary in order to recover the maximum volume of hydrocarbons contained therein. To require that the State Program be revised each time a new edge well was drilled or a new reservoir found would be wasteful, ridiculous, and of no value.

### 3 - Necessity

There seems little necessity for elaborate aquifer exemptions related to ER Projects for the following reasons:

- (1) The pressure sinks surrounding the producing wells in an ER project cause injected fluids to move inward toward producing wells rather than outward toward any other part of the formation. Such contained movement eliminates the direct potential for contamination of USWDS which may be located elsewhere in the same formation.
- (2) The Division knows of no instance in the State where drinking water is being produced and consumed by the public from an aquifer which is also an oil and/or gas reservoir at the same horizontal and vertical section. Some USDWs exist within the same vertical section but horizontally removed from the hydrocarbon zone. The San Andres formation in Eddy County provides excellent examples of both of these situations. These conditions are discussed and extensively referenced in Appendix A-1.

The review and approval process to be used for produced fluid disposal wells will assure aquifer protection on a case by case basis. This process is discussed later in this Section.

#### 4 - Approval Process - Enhanced Recovery

The actual approval process is discussed elsewhere in this demonstration. The result of this process, however, will be to permit completion of enhanced recovery injection (ER) wells in that vertical and horizontal portion of a geologic formation which contains hydrocarbons which may be susceptible to production from ER operations. Injection will be permitted in such zone and in the same interval normally not further than one-half mile from the outer boundary of the project. The outer boundary of any ER project may be considered to be a line which is determined by projecting horizontal and vertical lines through the outermost project wells (those wells which have produced or are demonstrated to have productive potential from the project). See Figure A-3.

#### 5 - Approval Process - Produced Fluid Disposal

Produced fluid disposal wells (SWD) will not be authorized to inject into a formation or part thereof containing water having TDS levels of 10,000 mg/l or less except under the following conditions:

- (a) The formation or zone has been declared an exempt aquifer as a part of the State demonstration or any subsequent amendment thereto; or
- (b) The applicant demonstrates at a public hearing, that said formation or part thereof meets the exemption criteria of Section 146.04 (a) and (b), (1), (2), or (3).

The Lea County study attached to this demonstration as Appendix A-2 illustrates the type of evidence the Division would seek in such cases.

All applications for approval of SWD wells not within an oil or gas zone or within one mile thereof will contain data on water quality in the proposed disposal interval. Any SWD well proposed for disposal into a formation or zone containing water of 10,000 mg/l TDS or less which is not an exempted aquifer will be set for public hearing before a Division examiner.

The Division will place the Dallas EPA office on its mailing list for hearing dockets as well as for copies of injection well permits.

Program Description

6-- Approval Process - Liquid Hydrocarbon Storage

Liquid hydrocarbon storage wells will be approved in the same manner as produced fluid disposal wells.

7 - Aquifer Exemption - Lea County

The Lea County study contained in Appendix A-2 contains extensive data on Permian age aquifers, their water quality, the potential for their use, alternative water sources, cost analyses, and the value of such aquifers for disposal purposes.

Based upon this study the Division proposes that the Tansil, Yates, Seven Rivers, Queen, Grayburg, and San Andres formations of Lea County be classified as exempt aquifers.

Please refer to Figures 8 and 9 of the Lea County Report, Appendix A-2 and Resource Map No. 6 from "Stratigraphy and Ground-Water Hydrology of the Capitan Aquifer, Southeastern New Mexico and Western Texas". by William L. Hiss (PHD Thesis, University of Colorado 1975) for the vertical and horizontal sections to be exempted. (See following). Because of the gradational nature of the back reef facies a more precise description is not proposed.

