UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET
ATLANTA, GEORGIA 30365

FEB 2 8 1983

# Casing and Cementing Guidance
# Class II Injection Wells
# Underground Injection Control Program

This guidance was prepared to provide further explanation for the requirements set forth in 40 C.F.R. §§144.28(e), 146.22, 147.504(b), 147.904(b), 147.1254(b), and 147.2154(b) for U. S. Environmental Protection Agency (EPA) regulated Class II injection wells in Florida, Kentucky, Mississippi, and Tennessee. The guidance reflects EPA Region IV's position on minimum acceptable casing and cementing to provide protection against contamination of underground sources of drinking water (USDWs) by Class II wells. In establishing these requirements, EPA assumed that wells will also be in compliance with State requirements.

## A. Guidance Applicability

This guidance is applicable to all Class II wells. It has been divided into Sections on newly drilled wells (Section C) and existing or newly converted wells in existing fields (Section D). Existing and newly converted Class II wells in existing fields are subject to less stringent casing and cementing requirements than newly drilled wells. These less stringent requirements are discussed in Section D.

- Newly drilled Class II wells are those drilled, cased, cemented and completed after the effective date of the EPA program for the purpose of enhanced recovery (2R), disposal (2D), or liquid hydrocarbon storage (2H). Such drilling and completion must be done in conformance with an issued EPA permit and any applicable State requirements.

  EPA Region IV program effective dates for Class II wells are as follows:

| State | Effective Date |
|---|---|
| Kentucky | June 25, 1984 |
| Tennessee | June 25, 1984 |
| Mississippi | December 30, 1984 |
| Florida | December 30, 1984 |

- Existing Class II wells are those used for enhanced recovery, disposal or liquid hydrocarbon storage prior to the effective date of the EPA program. Existing 2R and 2H wells must meet casing and cementing requirements within three (3) years of the EPA program effective date. Existing 2D wells must meet the requirements according to

whatever schedule is imposed at the time of UIC permit issuance. Permit applications for all existing 2D wells are due to EPA within four (4) years of the EPA program effective date. These dates are summarized as follows:

| State | Three (3) Year Deadline for Casing and Cementing of Existing 2R and 2H Wells | Deadline for Application Submittal for Existing 2D Wells |
|---|---|---|
| Kentucky | June 25, 1987 | June 25, 1988 |
| Tennessee | June 25, 1987 | June 25, 1988 |
| Mississippi | December 30, 1987 | December 30, 1988 |
| Florida | December 30, 1987 | December 30, 1988 |

- Newly converted Class II wells are those boreholes in existence before the date of this guidance that are converted to 2R, 2D, or 2H use after the EPA program effective date. Such wells must be under UIC permit prior to conversion and must meet the casing and cementing requirements in Section D.

B. Compliance and Enforcement

Operators currently in compliance with an EPA issued permit for a given well are not required to conduct any further remedial casing or cementing.

For enhanced recovery wells that are currently authorized by rule, EPA will review operator inventory submissions and notify operators if casing and cementing deficiencies exist.

EPA Region IV intends to work with any operator in developing a compliance schedule for rule-authorized wells not cased and cemented acceptably. These schedules will provide a reasonable amount of time for remedial action and will be included in administrative orders issued under Section 1423 of the Safe Drinking Water Act.

C. Newly Drilled Wells

Newly drilled wells must protect the entire USDW zone and isolate the injection zone with casing and cement.

1. USDW Isolation

All newly drilled wells shall have cement placed behind the outermost casing from ground surface into the confining zone immediately below the lowermost USDW.

2. Injecton Zone Isolation

The outermost casing shall have cement behind it through 100 feet of the confining zone immediately above the injection zone. Confining zones less than 100 feet in thickness shall be considered on a case-by-case basis. Generally, additional testing and demonstration will be required in those cases.

D. Existing Wells and Newly Converted Wells in Existing Fields

EPA's promulgated regulations (40 CFR §§144.28(e) and 146.22) provide less stringent than new well requirements for existing and newly converted wells in existing fields. For these wells, EPA will require protection of portions of USDWs with 3000 mg/l or less total dissolved solids (TDS) and isolation of the injection zone.

Existing and newly converted wells have been further divided into two types:

- Standard wells which have surface casing, long-string casing, and tubing with packer (typical in Mississippi).
- Nonstandard wells which are constructed with a single casing string normally 2 3/8" or larger (common in Kentucky).

1. Standard Wells

a. USDW Isolation

All existing or newly converted standard wells shall have cement behind the outermost casing through all functional confining zones in the interval between ground surface and the confining zone immediately below the base of the zone containing 3000 mg/l or less TDS.

As an alternative to placing cement, the operator may demonstrate that no fluid movement is occuring into or between waters containing 3,000 mg/l or less TDS. This demonstration can generally be made by a pulsed neutron type log and/or analysis of the USDW water quality variability, presence of confining units, and aquifer pressure relationships.

b. Injection Zone Isolation

The outermost casing shall have cement behind it through 100 feet of the confining zone immediately above the injection zone. Confining zones less than 100 feet in thickness shall be considered on a case-by-case basis. Generally, additional testing and demonstration will be required in those cases.

2. Nonstandard Wells

Nonstandard injection wells can be recompleted to standard wells by adding tubing and packer. Such wells are then subject to the standard well requirements outlined in Section D.1.

For existing nonstandard wells not completed to standard configuration, the requirements below must be met. No new or conversion wells to the nonstandard configuration will be permitted.

a. USDW Isolation

All existing nonstandard wells shall have cement behind casing from ground surface through the confining zone immediately below the lowermost USDW containing 10,000 mg/l or less TDS.

b. Injection Zone Isolation

The casing shall have cement behind it through 100 feet of the confining zone immediately above the injection zone. Confining zones less than 100 feet thickness shall be considered on a case-by-case basis. Generally, additional testing and demonstration will be required in those cases.

E. Cement Quality

Casing and cement shall be of the type and class designed for the life expectancy of the injection well. When cement is circulated to surface, it shall be with uncontaminated returns. If cement drops back due to settling, additional cement shall be added to top off to surface. Adequate cement is cement of sufficent quality that it does not allow for fluid migration which would endanger USDWs. In theory, the adequacy of cement for isolation is determined by the shear bond and hydraulic bond of the cement. However, these bond strengths cannot be measured directly. Existence of adequate cement shall be determined from cement records, logs, and other information.