



# Underground Injection Control Program

## Annual Report

Waste Plumes from Two Injection Wells.  
Waste Front Plotted for 1, 5, 10 and 40 Years.

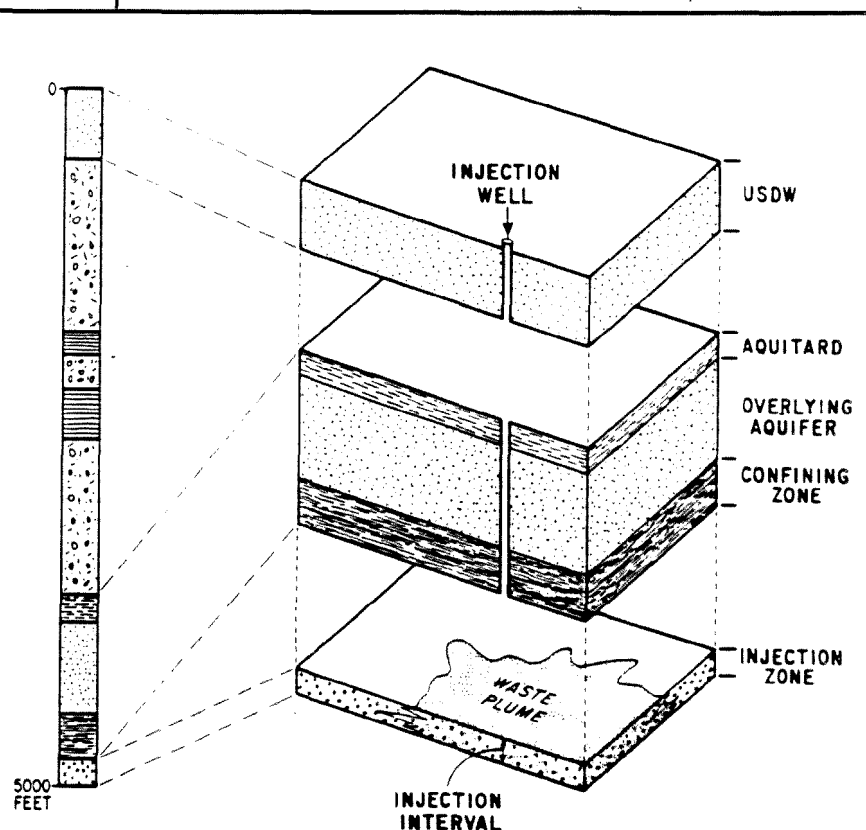
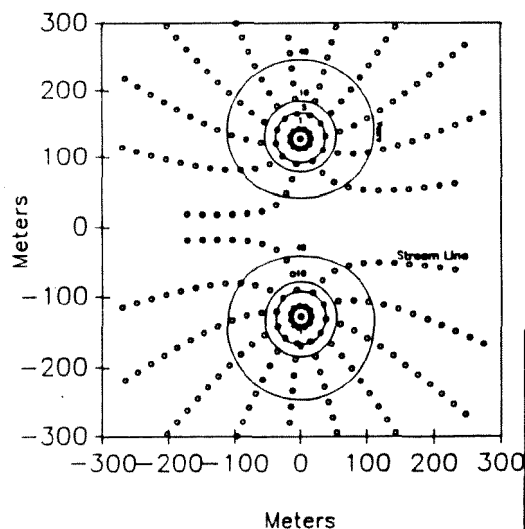


Figure 1. Deep injection well for hazardous wastes.

Cover design: illustration of injection well from "Waste Confinement Performance of Deep Injection Wells" by David S. Ward, et al, NWWA, 1987; illustration of waste plumes, by David W. Morganwalp, U.S. EPA.

**UNDERGROUND INJECTION CONTROL PROGRAM**

**ANNUAL REPORT**

**DECEMBER 1988**

**U. S. ENVIRONMENTAL PROTECTION AGENCY**

**Office of Water**

**Office of Drinking Water**

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## **I. BACKGROUND**

### **A. STATUTORY AND REGULATORY BASIS FOR THE PROGRAM**

#### **1. The Safe Drinking Water Act and UIC Regulations**

The Underground Injection Control (UIC) program was established under Part C of the Safe Drinking Water Act (SDWA) to protect underground sources of drinking water (USDWs) from endangerment by subsurface emplacement of fluids through wells. Part C of the SDWA requires EPA to:

- a. Identify the States for which the UIC programs may be necessary--EPA listed all States and jurisdictions;
- b. Promulgate regulations establishing minimum requirements for State programs which:
  - prohibit underground injection that has not been authorized by permit or by rule;
  - require applicants for permits to demonstrate that underground injection will not endanger USDWs; and
  - include inspection, monitoring, recordkeeping, and reporting requirements. These requirements are contained in 40 CFR Parts 144, 145 and 146.
- c. Prescribe by regulation a program applicable to the States, in cases where States cannot or will not assume primary enforcement responsibility. These direct implementation (DI) programs are codified in 40 CFR Part 147.

The regulations define five classes of wells:

Class I - injection of municipal or industrial waste (including hazardous waste) below the deepest USDW;

Class II - injection related to oil and gas production;

Class III - injection for mineral recovery;

Class IV - injection of hazardous or radioactive waste into or above a USDW; and

Class V - all injection practices not included in the other four groups.

In December 1980, Congress amended the SDWA to allow States to demonstrate the effectiveness of their in-place regulatory programs for Class II wells, in lieu of demonstrating that they met the minimum requirements specified in the UIC regulations. (Section 1425). Later amendments to the SDWA gave EPA the authority to issue administrative orders, required EPA to assess and submit a report to Congress on Class V wells and to promulgate regulations for underground injection practices on Indian lands.

## 2. SDWA and Resource Conservation and Recovery Act (RCRA) Interface

Class I wells which are used to inject hazardous waste must have authorization under both the Safe Drinking Water Act and the Resource Conservation and Recovery Act (RCRA). RCRA banned all disposal of hazardous waste in other than approved hazardous waste management facilities after October 1980. Although the UIC program under SDWA regulates the injection well below the wellhead, all Class I wells that inject hazardous waste must also be lawfully authorized under RCRA (through permit-by-rule or interim status) and meet associated requirements. The amendments to RCRA enacted through the Hazardous and Solid Waste Amendments (HSWA) of 1984 contain two provisions of particular significance to the UIC program.

First, any RCRA permit issued after November 8, 1984 must require corrective action for any prior and continuing release of hazardous waste or hazardous constituent from any solid waste management unit located at the facility. In order to fulfill these requirements, for any well which received a UIC permit after November 8, 1984, the primacy agency must determine; a) the number of wells at the facility, b) whether releases of hazardous wastes or constituents have occurred; c) whether the facility can demonstrate financial assurance of the estimated cost of any corrective action; and d) that corrective action is performed as appropriate.

Second, HSWA specifically prohibited the continued land disposal of untreated hazardous waste beyond specified dates, unless the Administrator determines that the prohibition is not required in order to protect human health and the environment

for as long as the wastes remain hazardous. The Agency proposed regulations implementing these provisions on August 27, 1987. The proposal sets out the standards by which owners and operators can continue to inject untreated hazardous wastes. The first effective date for the land ban provisions affecting injection well is August 8, 1988.

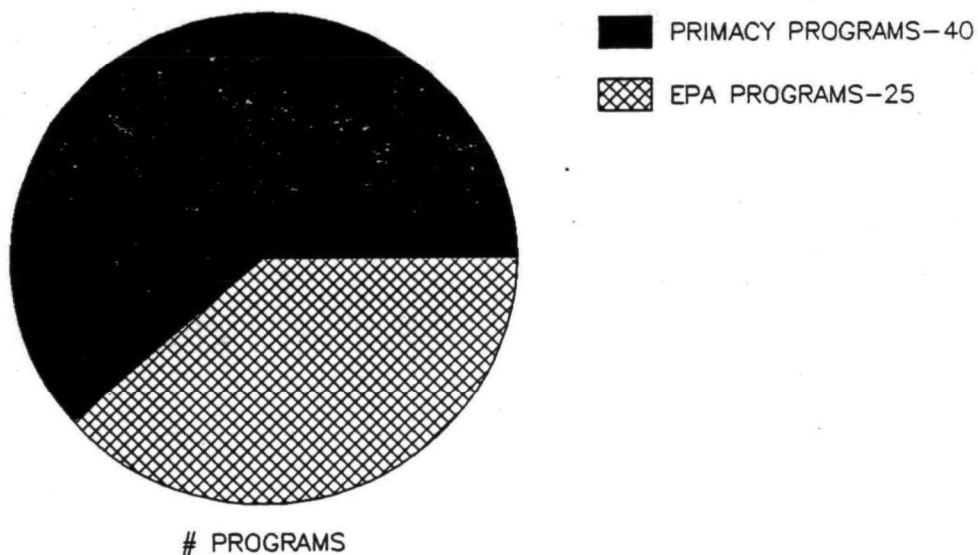
RCRA and the HSWA amendments affect a total of 83 hazardous waste management facilities with 192 (181 active) Class I hazardous waste (HW) wells regulated under the UIC program; over half of the facilities (49) are regulated by Texas and Louisiana alone and contain 73 percent (132 wells) of all Class I HW wells.

### 3. Status of UIC State Programs

By 1987, UIC regulations had been in place for at least two years in all States and jurisdictions, except some Indian Lands. Thirty-four States had primacy over all injection practices, six shared primacy with EPA, and 17 States had Federally-administered programs.

## DELEGATED PROGRAMS VS EPA IMPLEMENTATION

Figure 1



The national program office had begun two separate regulatory processes: one to establish criteria under which an Indian Tribe might obtain primacy over injection wells under its



TABLE 1

REGULATED INJECTION WELLS IN THE U.S.: 297,371

34 States Have Primacy  
Over All Injection  
Practices:

	Number of Wells
New Hampshire	47
Massachusetts	100
Maine	18
Connecticut	172
Vermont	1
Rhode Island	34
New Jersey	1,279
Delaware	29
Maryland	887
West Virginia	870
Alabama	437
North Carolina	95
Georgia	17
South Carolina	150
Ohio	6,341
Wisconsin	149
Illinois	16,320
Oklahoma	22,815
New Mexico	5,234
Texas	71,722
Louisiana	4,705
Arkansas	1,289
Nebraska	1,081
Kansas	16,014
Missouri	1,336
Wyoming	8,711
Utah	781
North Dakota	-0-
Commonwealth of the Northern Mariana Isl.	-0-
Guam	282
Idaho	2,364
Washington	13,999
Oregon	10,514
Nevada	328
(expected FY 1988)	

Six States  
Share Primacy  
With EPA

	Number of Wells
Florida	7,368
Mississippi	1,099
Colorado	1,145
South Dakota	95
California	19,863
Alaska	3,013
<u>Two Indian Lands Have Federally-Administered Programs</u>	
Osage Mineral Reserve (OK)	4,490
Navajo Lands	509

17 States Have  
Federally-  
Administered  
Programs

	Number of Wells
Puerto Rico	2,223
New York	5,680
Virgin Isl.	71
Dist. of Col.	-0-
Pennsylvania	7,201
Virginia	1,867
Tennessee	57
Kentucky	5,928
Indiana	4,788
Minnesota	2,122
Michigan	6,135
Iowa	262
Montana	6,530
Arizona	24,810
American Samoa	-0-
Trust Territories	-0-
Hawaii	328

DISTRIBUTION OF INJECTION WELLS

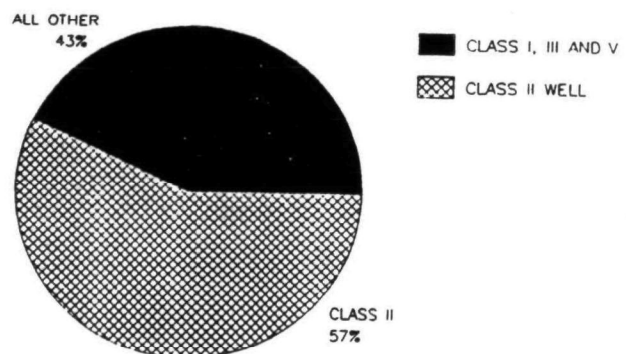


Figure 2

jurisdiction, and one to promulgate Federally-administered programs for all Indian Tribes who would not or could not assume primacy.

#### B. THE REGULATED UNIVERSE

In 1987, the national UIC program well inventory numbered close to 300,000 injection wells. States had primary enforcement authority over approximately 73 percent of these wells.

#### DELEGATED PROGRAMS VS EPA IMPLEMENTATION

# OF INJECTION WELLS

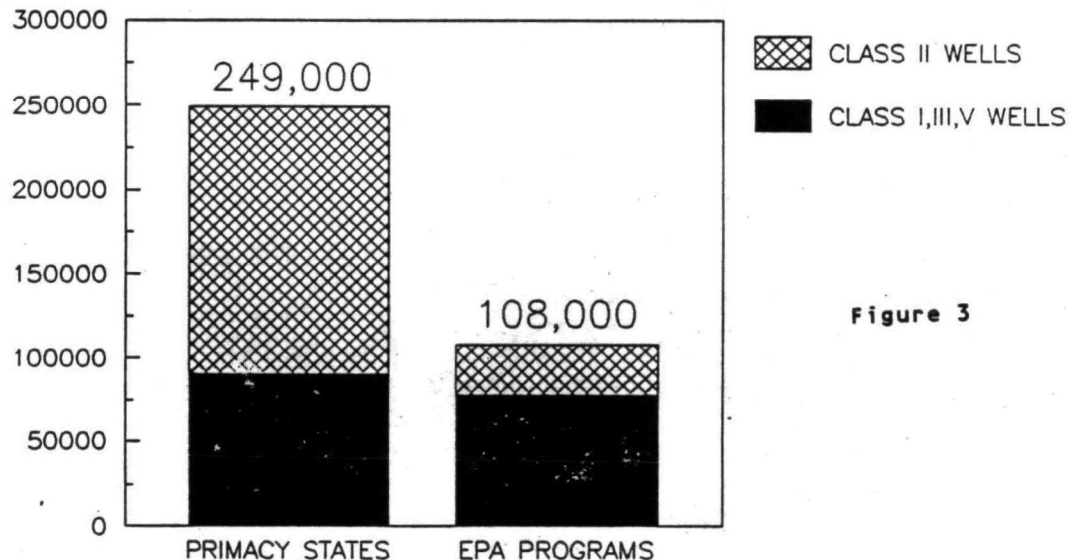


Figure 3

Over half, (168,394) of all regulated injection practices were active Class II wells. Most of them were located in the oil and gas production States of Texas, Oklahoma, Kansas and Illinois; these States each reported more than 14,000 active Class II wells.

Class V wells constituted the next largest number of wells, however, their actual number is unknown. During 1987, EPA identified 173,159 wells in the Report to Congress but the Agency and States had not completed an all inclusive inventory of these practices.

In all, there were 558 Class I wells in the EPA inventory of which 192 were classified as hazardous waste wells. Most Class I hazardous waste wells were located in Texas (76) followed by Louisiana (56).

Class III wells, associated with mining activity, numbered 19,604 at 263 facilities. Most wells were located in Texas (17,285) followed by Wyoming (871) and Arizona (484).

Class IV injection wells are banned by the UIC regulations (and RCRA if they are used to inject hazardous waste) except for wells associated with aquifer remediation under approved CERCLA or RCRA clean-up plans. There were 21 temporarily abandoned Class IV wells in 1987. Fourteen of these wells were radioactive waste disposal wells in the State of Washington. None of these wells were being used to inject wastes.

#### DISTRIBUTION OF CLASS II WELLS

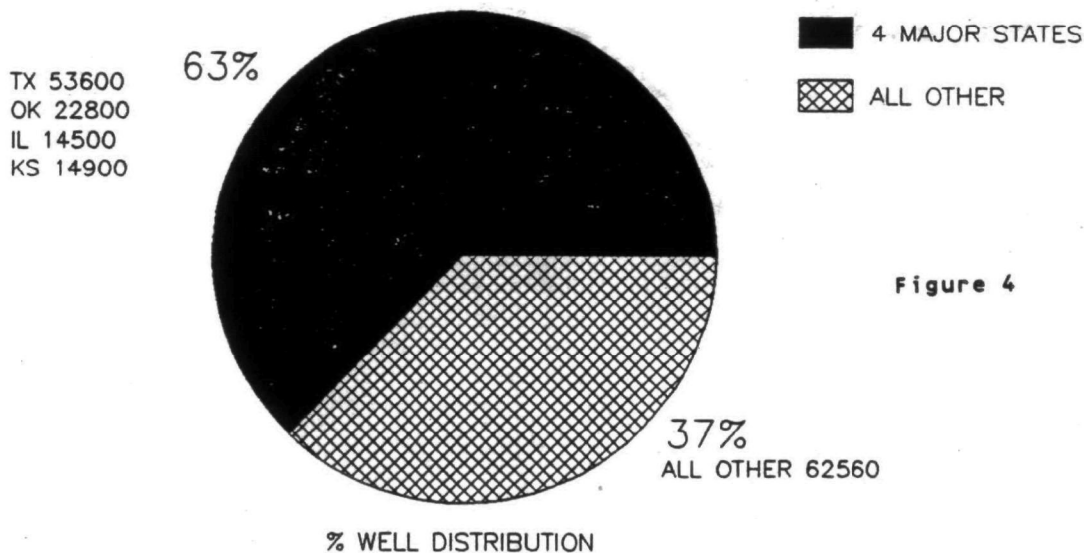


Figure 4

#### C. PROGRAM OBJECTIVES AND PRIORITIES

In the FY 1987 operating guidance, the Agency stated that the goal of the UIC program was to "assure the effective

implementation of high quality direct implementation and primacy programs." The guidance identified three objectives for the program:

- Objective I: Assure that programs conform to applicable regulations and program descriptions
- Objective II: Assure that reporting is accurate and used for management purposes
- Objective III: Assure that EPA and primacy States take timely and appropriate action to resolve instances of significant noncompliance

In addition, the Guidance contained a list of priority activities for the program from which three other major objectives emerged:

- Objective IV: Vigorously control land disposal of hazardous waste by injection wells
- Objective V: Establish a strong comprehensive enforcement program not limited to significant noncompliance
- Objective VI: Initiate program enhancement

The following report examines the program's accomplishments in achieving these objectives and priorities.

## II. FY 1987 PROGRAM ACCOMPLISHMENTS

### A. OVERSIGHT ACTIVITIES

As stated above, the first objective of the program was to assure that State and EPA Regional programs conformed to applicable regulations and program regulations. To accomplish this objective the Program undertook the following activities:

#### 1. State Audits

The Headquarters UIC Program Office and various Regional Offices participated in joint evaluations of the Kansas, Texas and California 1425 programs. Each evaluation was conducted as a cooperative effort between the Regional Office and

Headquarters with the Region functioning as the lead. The Reviewers used an informal agenda and a State evaluation guidebook. All major program elements were reviewed and discussed with emphasis on permitting, file reviews, mechanical integrity, enforcement, and inspections, data management, public outreach, plugging and abandonment and resource need and staffing pattern. The forum for discussion was informal allowing input from all participants. Finally, the visiting team developed a report of its findings designed to highlight areas of outstanding performance and identify areas of concern and possible improvement. Some areas of findings common to most State programs that reflect major strengths were:

- \* Good organization and highly qualified staff;
- \* Well organized and efficient permit procedures;
- \* Generally good construction requirements applied to new wells; and
- \* Well maintained filing systems.

A major area of concern common to most State programs was:

The need for improvement in enforcement and compliance activities including tracking field data, documentation of all violations and enforcement actions; and improving the level of consistency in the protection of all USDWs.

Other areas of concern applicable to one or more programs were:

- \* Failure to conduct a complete area of review analysis during permit determination;
- \* Failure to conduct an initial pressure test before using annulus pressure monitoring as a method of demonstrating mechanical integrity;
- \* Failure to submit major program modifications for EPA approval;

The review process proved to be effective as an oversight activity in enhancing communication lines between the regulator

and the well owner or operator. The UIC Program Office will continue the process in the next fiscal year.

## **2. Peer Reviews**

The UIC program offices in Headquarters and the Regions created a highly successful new oversight activity, peer review, where UIC staff from the Headquarters Programs Division and Regional Offices visited four Regions in 1987 and observed day-to-day implementation of Federally-administered programs. Unlike the annual mid-year evaluations conducted Agency-wide by the program managers, peer review served as a forum for Regional UIC Program staff to exchange information about each other's experiences in implementation and enforcement activities associated with Federally-administered programs, and to offer program assessments or technical assistance informally. The UIC Program Office acted as a facilitator rather than an evaluator in this process. Regions participating in the process concluded that it provided more opportunity than the mid-year evaluation for Regional cooperation, "team" building, and constructive recommendations for improvement in program performance. The UIC Branch will complete these peer reviews in FY 88 and begin a cycle of peer review of activities associated with Regional oversight of State-administered programs.

## **3. Mid-Year Evaluations**

In addition, Headquarters staff participated in the Office of Water mid-year evaluations in all ten Regional Offices. Mid-years were used to formally evaluate EPA implementation of UIC programs and EPA oversight of primacy programs at least once during the fiscal year. Major issues identified during these evaluations, such as inconsistencies in program reporting data, were resolved through Headquarters' seminars. Other issues, such as significant noncompliance, were resolved through UIC program guidance.

## **B. DATA MANAGEMENT**

The FY 87 Operating Guidance called for the program to "assure that reporting is accurate and used for management purposes". This goal was accomplished through the following activities.

1. Data Awareness Training

After six years of program experience, the UIC Branch conducted a review of the UIC Federal Reporting System forms and revised the national reporting forms in an effort to increase the accuracy and consistency of reporting nationwide. EPA, assisted by the Underground Injection Practices Council, conducted pilot sessions for a "Data Awareness Training" Seminar in Kansas City and Chicago. State and EPA participants reacted favorably, and the Program Office planned to complete the training in FY 1988.

2. Increased Noncompliance Reporting

Prior to FY 1987, EPA required Regions and States to report only Class I or IV well violations four times (quarterly) each year and other classes annually. There are approximately 558 Class I and 21 Class IV wells. These wells are considered to have a high potential for contamination because they inject into or above or within one quarter mile of a USDW. However, Class I/IV wells actually represent only a small subset of the well universe with a high potential for contamination. Thus, in FY 1987, the Office of Drinking Water expanded quarterly reporting to include noncompliance reporting for all classes and facility-specific significant noncompliance on an exceptions basis. The Office of Drinking Water developed the Quarterly Exceptions List as a means to track facility-specific significant noncompliance information on violators that had not returned to compliance or been subjects of a formal enforcement action for at least two consecutive reporting quarters.

3. Administrative Order Tracking System

In FY 1987, the Office of Drinking Water initiated a successful joint effort with Regional Offices to develop an automated record management system for Headquarters and the Regions to track Administrative Order issuance and compliance follow-up (the AOTS). The system will facilitate EPA tracking of Notice of Violation and Administrative Order records, associated compliance actions, and violations. AOTS reports will provide timely summaries of overall activity, record-specific status reports and compliance action "tickler" and overdue reports. The system will be completed and in use by early 1988.

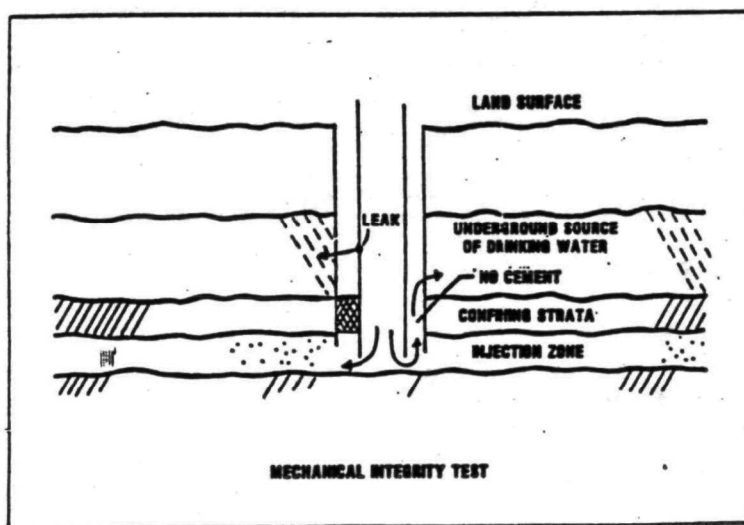
### C. REGULATION OF THE UIC WELL UNIVERSE

During the first five years after program delegation, each UIC Director's major goals are to assure: 1. that all underground injection wells in existence when the applicable regulations become effective have permit determinations; 2. that wells that continue to operate under authorization-by-rule rather than by permit are technically up to UIC standards; and, 3. that all injection wells receive mechanical integrity tests.

#### 1. Testing the Mechanical Integrity of Wells

The effectiveness of any Underground Injection Control Program depends on the integrity of its injection wells. A well is said to have mechanical integrity when the operator can demonstrate through EPA approved tests that there are no significant leaks in the well or fluid migration into the vertical channels outside the well bore.

In 1987, the two methods most often used by well operators to test for significant leaks were a pressure test of the casing to detect any rapid pressure decline or a review of injection pressure/volume monitoring records. By far, the most commonly used method to detect fluid migration was to evaluate the integrity of cement used in construction through a review of a well's cement record.



The UIC regulations allow EPA and State program directors to continue to regulate existing Class II enhanced recovery and hydrocarbon storage wells under existing State regulations if they meet general UIC requirements, rather than impose additional permitting requirements. Approximately 70 percent,



or 118,800, of all Class II wells that are currently regulated by the UIC program (168,394) are regulated in this manner. However, they must all be tested for mechanical integrity.

The Office of Drinking Water closely monitored Class II activities in seven Class II primacy programs approved under Section 1425 because they regulated 54% of all existing Class II wells (Alabama, Oklahoma, Texas, New Mexico, Louisiana, Utah, and Wyoming). These States declared 64,697 Class II wells in their respective inventories at time of program approval. Most of the States had completed testing their existing wells, or, as in Louisiana, temporarily shut in wells until testing could be completed, or as in Texas, received an extension to complete the testing of its existing wells.

The data for casing/tubing pressure test results indicate an 88 percent pass rate for all Class II wells (22,353 out of 25,278 tests) and for cement record reviews, a 95 percent pass rate (21,293 out of 22,357 tests). Close to three thousand Class II wells failed MI tests and required some type of remedial action to return them to compliance. In most cases, when a well was not in compliance the well owner initiated plugging and abandonment (P & A) procedures (38 percent of all noncompliance).

## **2. Permit Determinations**

The FY 87 guidance set the following priorities for permit determinations:

- New Class II wells
- Existing Class I wells
- Existing Class III wells
- New Class I and III wells
- Existing Class II salt water disposal wells

UIC Program Directors rank the permit determination for a new Class II well which is associated with oil and gas production as a top priority because of the SDWA mandate that the UIC program not unduly impede the petroleum industry. UIC Program Directors completed 8,130 Class II permit determinations in 1987; eighty-five percent of the determinations were permits for new Class II wells; the Ohio, Arkansas and Texas programs together issued over four thousand. Two hundred five permits

were for existing Class II wells or well fields; 185 of those were for existing salt water disposal wells.

By the end of 1987, UIC Program Directors had completed permit determinations for all but 25 of 350 existing Class I wells, in keeping with the regulatory requirements that all existing Class I wells receive permit determinations within the first five years of the effective date of the program. UIC Program Directors issued 23 new Class I permits.

Of the 127 existing Class III permit determinations completed in 1987, forty-five were permits issued to existing wells. Eighty-two permits were issued to new Class III wells.

### 3. Review of Existing Permit Files

The UIC regulations authorize the review of the State file (well record) for an existing Class II well to determine its compliance status in lieu of issuing a new UIC permit. UIC Program Directors must make these determinations during the first five years of the applicable UIC program. A total of 94,509 determinations against a target of 115,070 have been completed since the onset of the UIC program; 24,896 were made in FY 1987. Federally-administered UIC programs became effective in 1984. The Regional UIC Program Directors have until 1989 to complete their determinations.

## D. DEVELOPMENT OF A COMPREHENSIVE UIC ENFORCEMENT PROGRAM

### 1. Expansion of EPA's Authority

The SDWA Amendments of 1986 substantially increased EPA's enforcement authority which meant that in FY 1987 the UIC compliance and enforcement program changed dramatically from a program that had to rely exclusively on the slow and resource intensive judicial enforcement process to compel compliance with program requirements, to a program that could issue orders for compliance and assess administrative penalties in a relatively short period of time. Headquarters put in place administrative procedures and guidances for the enforcement program prior to proposal and promulgation of procedural regulations. This was a calculated risk that the UIC program office was willing to take in order to quickly provide the Regions with the tools to begin

using this important new authority. During the 39 months that enforceable UIC requirements had been in effect in the majority of DI States, the UIC program had taken less than 15 judicial actions. With the new AO procedures in place, it was able to initiate over 100 administrative actions; by the end of FY 1987, the EPA Regional UIC Program Directors had issued 89 proposed UIC AOs and 18 final AOs. Following is a chronology of actions the ODW took in response to the SDWA amendments of 1986:

- December 1986: The Office of Drinking Water issued guidance on the UIC program definition of SNC for all classes of wells the general program reporting procedures guidance (UICP Guidance #52) and the UIC Compliance Strategy
- January 1987: The Offices of Drinking Water and Enforcement and Compliance Monitoring jointly issued guidance to the Regions on procedures to be used for issuing Administrative Orders (AO) which require compliance, assess a penalty for both.
- March 1987: ODW issued the general program and, a clarification on how to classify certain MIT failures and pressure limitation exceedences (September 9, 1987).
- April 1987: The Program Office issued a Compliance Strategy which defined the major compliance management policies, guidance, and procedures for implementing the compliance and enforcement aspects of the program over the next five years, published the second phase of Quality Assurance Guidances for field inspections and continued development of a general procedural manual for field inspectors to be published early in FY 1988.

## 2. Timely and Appropriate Enforcement

The third objective of the program in 1987 was to assure that Regions and States took timely and appropriate action in response to significant noncompliance. The Office of Drinking Water had worked with its Regional Offices, State primacy

agencies and the Underground Injection Practices Council over a thirteen month period to develop a definition of noncompliance that would give the UIC program director discretion to determine whether or not a violation by a well owner or operator (noncompliance) could result in endangerment to a USDW. This type of violation would be labeled as "significant noncompliance" (SNC) and would be documented taking into account 12 specified criteria. This definition, issued in December 1986, expanded the UIC program's universe of potential SNC violators to include Class II, III, and V well owners and operators, an increase from some 566 wells to over 153,000 wells. Timely and appropriate meant that the regulatory authority (State or EPA) would have to address SNC violations in less than 90 days. FY 1987 was the first year in which the UIC program used this enforcement criterion for SNC violations covering all five classes of UIC wells. Following is a discussion of reported SNC during 1987, its discovery and its resolution. (NOTE: interpretation and correlation of the data compiled this first year was difficult because there were many inconsistencies and discrepancies in reporting nationwide.)

For the most part, Regions and States reported that they were able to address significant noncompliance in less than 90 days using informal means, resulting in rapid return to compliance. UIC Program Directors reported 340 violations involving approximately 59% of the Class I/IV well universe. Violations for these wells are always considered SNCs. At year's end, only five Class I wells and one Class IV well remained on the exceptions list. Two of the Class I wells were sewage disposal wells in Florida and two were industrial disposal wells in Oklahoma. The Class IV well is a potential CERCLA site and was awaiting evaluation before plugging and abandonment could be completed.

UIC program directors reported 1,820 violations involving Class II, III, and V wells. Of these, 1,551 violations affected less than one percent of the Class II well universe. Forty-seven percent (1,024) of the reported SNC violations occurred in Kentucky which has a Federally-administered program. The EPA Region IV Office negotiated a landmark consent order requiring plugging and abandonment and other actions with Ashland Exploration Company, which involved Class II enhanced recovery wells and widespread ground-water contamination. (See discussion of Administrative Orders.) Another sixteen percent

(362) of the SNC violations occurred in Pennsylvania which also has a Federally-administered program and was associated with unauthorized injection which EPA ultimately eliminated. In all only one Class II well appeared on the exceptions list, a salt water disposal well which failed mechanical integrity and it was scheduled to be plugged and abandoned. There were only sixty-seven SNC violations involving either Class III or V wells, none of which appeared on the exceptions list.

3. Noncompliance other than Significant: Violations, Enforcement Actions and Return to Compliance

The fifth objective of the UIC program was to establish a strong comprehensive enforcement program not limited to significant noncompliance. Nationally, UIC Program Managers identified over 25,000 violations affecting all classes of wells during 1987; over half (13,700) of these were monitoring and reporting violations. They initiated around 42,000 enforcement actions, most of which were informal actions, and by the end of the year, they verified that over 10,000 wells had returned to compliance. Following are the 1987 national totals of violations, enforcement actions and wells returned to compliance broken out by each well class and its corresponding inventory. (NOTE: National summary data could not be correlated, as each element was reported as a discrete activity in 1987.)

Class I well Inventory: 558 wells

- 360 violations;
- 204 enforcement actions;
- 153 wells returned to compliance.

Class II well inventory: 168,394 wells

- 23,770 violations;
- 40,874 enforcement actions;
- 9,814 wells returned to compliance.

Class III inventory: 19,604 Class III wells

- 1,108 violations;
- 103 enforcement actions;
- 73 wells returned to compliance.

Class IV inventory: 21 Class IV wells

- 8 violations;
- 4 enforcement actions;
- 2 wells returned to compliance.

Class V inventory: 108,794 wells

- 776 violations;
- 263 enforcement actions;
- 105 wells returned to compliance.

Proportionately, on a per well basis, there were more violations identified for Class I and Class IV wells than for other classes of wells. This high proportion does not necessarily reflect that more violations occurred with these types of injection practice. The well universe is smaller than for either Class II, III, or V wells and require fewer resources, which has been an important factor in the UIC program's ability to identify and resolve violations.

By the same token, the lower ratio of violations to wells associated with Class II, III, and V injection practices does not necessarily indicate that fewer violations occur. Class II wells have fewer specific requirements than Class I wells and are less stringently regulated so as not to impede oil and gas production.

Class III wells, although they are associated with production rather than waste disposal, are more stringently regulated than Class II wells; and as with Class I wells, tighter monitoring has resulted in fewer violations.

Very few violations have been identified and reported for Class V wells considering how many types and numbers there are. The main reason has been because EPA has not yet established specific requirements for Class V wells in the UIC program regulations, as it has for other classes. The Agency will develop regulations when it has completed an assessment of this largely unknown injection practice.

4. Field Inspections

The UIC program established an effective field presence during FY 1987 as evidenced by the amount of noncompliance it identified during on site inspections. Even so, most States were able to target only a percentage of their wells for inspection each year because of large inventories. Kansas for example, targeted 25% of its 16,000 wells for inspection.

In all, the UIC Program Directors conducted 80,938 field inspections, 18,000 more than 1986; 46,370 wells were inspected in accordance with Agency priorities:

1. Emergency inspections, Class IV closure verification, and citizen complaint investigation.
  - UIC program managers conducted 104 on-site investigations of this type during FY 1987.
2. Mechanical Integrity Testing witnessing and enforcement inspections.
  - UIC program managers witnessed 18,778 MITs.
3. Preoperational, plugging and abandonment verification and record inspections.
  - UIC program managers conducted 2,421 pre-operational, or well construction inspections and 2,261 plugging and abandonment inspections.
4. Routine inspections to determine compliance with rules and regulations.
  - The majority of inspections that were conducted in 1987: UIC program managers conducted 57,455 routine inspections.

#### **E. PROGRAM ENHANCEMENT**

##### **1. Assessment of Class V wells**

In FY 87, the Director of the Office of Drinking Water established a special task force to develop a strategy for regulatory development of Class V wells before the end of FY 1988. Class V wells include all injection practices not included in Classes I, II, III, or IV, have innumerable construction designs and uses, and their actual number is unknown. Its first activity was to coordinate the national survey of Class V injection practices in the United States mandated by the SDWA Amendments of 1986.

corresponding inventories of Class V wells in the United States and its Territories and Possessions; it described primary contamination problems associated with different categories of these wells, and summarized State recommendations for minimum design, construction, installation, and siting requirements that could be applied to protect USDWs from such contamination wherever necessary including corrective action and remedial action recommendations.

The report identified seven general categories and inventoried over 173,159 Class V wells; over half of these were agricultural drainage wells, primarily located in the western part of the United States and considered to have a high potential for ground-water contamination. Some 32 subcategories included geothermal wells, domestic waste disposal wells, wells related to mineral and fossil fuel recovery, industrial/commercial/utility wells, recharge wells and mis- and miscellaneous wells, for example.

## 2. Response to HSWA Amendments

In order to vigorously control the land disposal of hazardous waste, ODW established the Hazardous Waste Restriction Task Force to implement Sect. 3004 of RCRA as it pertains to injection wells by reassessing the use of Class I wells as a means of disposing of hazardous waste. The Task Force prepared a proposed regulation which would define the two circumstances under which a waste otherwise prohibited from injection may be injected: (a) when the waste has been treated in accordance with requirements of Part 268 pursuant to Sect. 3004(m), or (b) when an applicant has demonstrated to the satisfaction of the Administrator that there will be no migration of hazardous constituents for as long as the waste remains hazardous. The Task Force also proposed amendments to UIC regulations at Part 146 applicable to all owners and operators of Class I

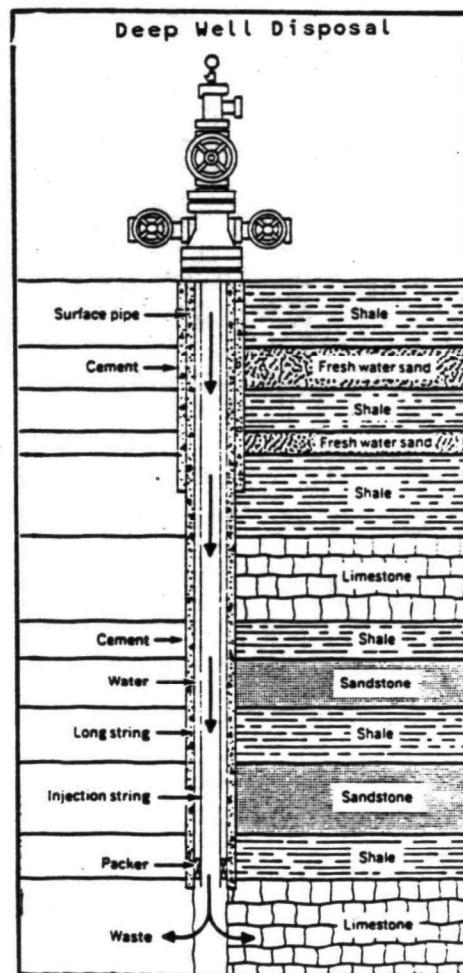


Figure 5



hazardous waste wells that:

- would improve or increase current monitoring, operating, siting, construction, and testing regulatory requirements for Class I hazardous waste wells.
- would list methods for monitoring Class I injection activities.

3. Assessment of Alternative Mechanical Integrity Tests

The Director of ODW appointed a workgroup to evaluate and forward proposed alternative mechanical integrity tests for management approval or disapproval. In 1987, the workgroup reviewed thirteen MITs and recommended approval of five with some restrictions or limited use: radioactive tracer, dual/completion, water-in-annulus, annulus pressure/gas detector, and temperature anomaly. The workgroup recommended against the cement bond log/cement evaluation and pressure fall-off methods.

4. Dissemination of Technical Guidance

The Branch published technical assistance materials for Class I hazardous waste well operators and owners titled: "Annulus Pressure Monitoring for Class I wells;" and "Class I Hazardous Waste Injection Wells: Evaluation of Noncompliance Incidents," "Annulus Pressure Monitoring for Class I Wells;" and "Assessment of Treatment Technologies Available to Attain Acceptable Levels of Hazardous Waste in Deep Injection Wells."

In addition, the Branch developed and disseminated other technical guidances to UIC Program Directors of Federally-administered programs:

- Inventory of Abandoned Oil and Gas Wells in Allegany County, New York - Region II
- Inventory of Abandoned Oil and Gas Wells in Cattaraugus County, New York - Region II
- Preliminary Assessment and Evaluation of Ground Water Contamination in Allegany, Cattaraugus and Chautauqua Counties, New York - Region II

TABLE 2

Mechanical Integrity Tests Reviewed, or Under Review, by the EPA MIT Workgroup

TEST	WELL CLASS	AREA OF USE	PARTS TESTED FOR *	COMMENTS
1. Radioactive Tracer	All	Nationwide	1 & 2 (Partial)	Approval in <u>Federal Register</u> 9/18/87, revisions published in <u>FR</u> 12/10/87. Approval is for detection of casing leaks and movement behind casing from injection interval with restrictions described in the <u>FR</u> notices. Currently approved for timed run but not velocity shot methods.
2. Dual/Completion	II	Montana, Wyoming, Kansas, Nebraska, Michigan & Osage Mineral Reserve in Oklahoma	1	Two year interim approval in <u>FR</u> 10/29/87. Restricted to wells where oil is extracted above the packer isolating the injection zone.
3. Cement Bond Log/ Cement Evaluation Method	All	Nationwide	2	Logs that detect specific parameters could be useful to determine conditions that would allow fluid movement outside a casing. EPA Headquarters does not consider this as an alternate MIT and it can be used in addition to, but not in lieu of other, approved methods.

TABLE 2 (Cont'd.)

TEST	WELL CLASS	AREA OF USE	PARTS TESTED FOR *	COMMENTS
4. Water-in-Annulus	II	Specific counties in the Bradford field area of Pennsylvania and New York	1	Restricted to wells with the construction and in a geologic setting as that found in the Bradford field. Currently under a second interim approval which ends in July, 1988.
5. Pressure Falloff	II	New York	1	The workgroup recommended against the test and is not conducting further review at this time.
6. Annulus Pressure/ Gas Detector	II	Pennsylvania and New York	1	Limited to wells with construc- tion including multiple tubings and located in a geologic setting as found in the Bradford field. <u>FR</u> notice is being pre- pared.
7. Temperature Anomaly	II	Kansas	1	Restricted to slimhole wells without tubing and packer. In- jection fluid must be of a cer- tain temperature and log must be run in a given time interval. Other restrictions apply to well construction, location and test procedures. Workgroup rec- ommended approval which has been requested of EPA Headquarters.

TABLE 2 (Cont'd.)

TEST	WELL CLASS	AREA OF USE	PARTS TESTED FOR *	COMMENTS
8. Differential Temperature	II	Nebraska	1	Workgroup has finished its review and it is being studied at EPA Headquarters.
9. Surface Casing in Annular Disposals	II	Ohio	1	Workgroup has reviewed preliminary information from Reg. V but is awaiting formal submission from Ohio. This type of well is prohibited in 40 CFR 144.28(f)(1).
10. Large Bore Packerless Municipal Waste	I	Florida	1	Workgroup recommended against fresh water test. Request has been resubmitted and is being reviewed further.
11. Salt Solution Mining Gallery Test **	III	Nationwide	1	Because of very large cavities created by the mining, the workgroup believes a very small loss of pressure can represent a very large volume of fluid loss. Since the test lacks adequate sensitivity, the workgroup plans to issue a statement against its continued use.

TABLE 2 (Cont'd.)

TEST	WELL CLASS	AREA OF USE	PARTS TESTED FOR *	COMMENTS
12. Oxygen Activation	AI1	Nationwide	2	This is being proposed through Region V and has been tested at the Kerr Lab in Ada, Okla. and producing areas. Initial data are very promising that test can detect movement of water behind a casing.
13. Injection Pressure/ Zero Annulus Monitoring and Bradenhead Test without initial Pressure Testing***	II	New Mexico, Oklahoma	1	Studies by the two states were reviewed. The workgroup recommends these tests be used only after an initial annulus pressure test. Subsequent monitoring should be done only when positive surface pressure is maintained in the annulus.
<p>* Part 1 refers to leaks in casing and in some cases, tubing and packer. Part 2 refers to fluid movement behind casing. These are described in 40 CFR 146.8.</p> <p>** Gallery testing has been used in several Regions as an alternative to individual well pressure tests. The workgroup believes there is a significant difference in the two methods and that gallery testing should be evaluated separately. The workgroup met with salt solution mining industry representatives and requested information on the sensitivity of gallery testing, a formal request for review, and/or other alternative MITs. The requested information has not been submitted.</p> <p>*** These tests were not formally submitted by the States or Region VI for workgroup review. The workgroup was asked, by the UIC Branch Chief at HQ, for technical review of the EPA funded studies.</p>				

- Ground-Water Monitoring Report - Region V
- Assessment of UIC Framework in Virginia - Region III
- Constant Positive Annular Pressure Requirement for Class II Wells - Region V
- Assessment of Agricultural Return Flow Wells in Arizona - Region IX

#### F. 1987, THE YEAR OF TRANSITION

FY 1987 marked a year of transition for the UIC program. By the end of FY 1986, UIC program managers had completed, for the most part, identifying and permitting the existing injection well universe and bringing it under regulation, and had begun increasing their efforts to identify and bring violators into compliance. FY 1987 presented a significant challenge to the Agency to meet the statutory mandates of the RCRA and SDWA amendments. Substantial progress was made in meeting program goals and priorities for both of these statutes. Moreover, the UIC compliance and enforcement program made major progress and could stand on its own with the other more mature Agency enforcement programs. The UIC program office and program directors accomplished a lot, but there was still a significant amount of work to be completed.

FY 1988 would present more challenges to EPA. Headquarters would be completing and implementing the national automated AO tracking system, promulgating AO procedure regulations, promulgating regulation changes to improve enforceability especially against rule authorized owners and operators, completing an administrative penalty policy, and developing guidance for calculating the economic benefit associated with certain UIC noncompliance practices. For the Regional Offices this would mean a continued emphasis on issuance of UIC AOs for SNC and other violations, tracking and follow-up to ensure compliance with AOs issued previously and closer oversight of approved programs to ensure that they followed the timely and appropriate enforcement criteria.