

A Study of Idle Oil and Gas Wells in the United States

Interstate Oil & Gas Compact Commission

and

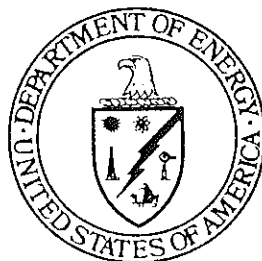
United States Department of Energy

This report was sponsored by the United States Department of Energy, Office of Fossil Energy. This study was implemented under Contract 18-4269 from Sandia National Laboratories, Albuquerque, NM 87185, which is operated by the United States Department of Energy under Contract DE-AC04-76DP00789.

NOTICE: This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, nor any of their contractors, subcontractors, or their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government, any agency thereof or any of their contractors or subcontractors. The views and opinions expressed herein do not necessarily state or reflect those of the United States Government, any agency thereof or any of their contractors.

A STUDY OF IDLE OIL AND GAS WELLS IN THE UNITED STATES

December 1992



INTERSTATE OIL AND GAS COMPACT COMMISSION

and

UNITED STATES DEPARTMENT OF ENERGY

Published and Distributed by the Interstate Oil and Gas Compact Commission,
Headquarters Office, 900 Northeast 23rd Street, P.O. Box 53127
Oklahoma City, Oklahoma 73152 • Telephone: (405) 525-3556
ISBN 1-879386-02-X

TABLE OF CONTENTS

	Foreword	v
	Idle Well Subcommittee Membership	vii
I.	Executive Summary	1
II.	Introduction	4
III.	State Summaries	
	A. Statutory Authority and Definitions	6
	B. Security or Financial Assurance	18
	C. Plugging Funds and Well Plugging Authorization	27
	D. Temporary Abandonment Procedures and Technical Requirements	35
	E. Data Management, Well Tracking, and Inventory Methods	41
	F. Energy and Environmental Concerns	46
	G. Idle Well Statistics	49
IV.	New Legislation, Other Programs, and Mapping Projects	63
V.	Recommendations	77
VI.	Appendices	
	A. Draft New York Abandoned Well Plugging Program	A-1
	B. Kansas Corporation Commission Temporary Abandoned Well Policy and Procedure	B-1
	C. EPA Management & Monitoring Requirements for Class II Wells in Temporary Abandonment Status	C-1
	D. Resource Potential Associated with Idle Wells	D-1
	E. List of State Officials Providing Information for this Report	E-1

LIST OF TABLES

I.	State Security or Financial Assurance Requirements	23
II.	State Plugging Funds	32
III.	State Temporary Abandonment Procedures & Technical Requirements	38
IV.	State Idle Well Statistics	51
DI.	Estimated Oil Resource Potential Associated With Idle Wells	D-4



BRERETON C. JONES
GOVERNOR

DEPARTMENT OF MINES AND MINERALS

DIVISION OF OIL AND GAS
P.O. BOX 14090
LEXINGTON, KENTUCKY 40512-4090
(606) 254-0367

BURL SCOTT
COMMISSIONER

D. MICHAEL WALLEN
DIRECTOR

December 21, 1992

Governor Joan Finney, Chairman
Interstate Oil and Gas Compact Commission
P. O. Box 53127
Oklahoma City, OK 73152-3127

Dear Governor Finney:

It has been my pleasure to chair the Idle Well Subcommittee of the Compact's Council of State Regulatory Officials. Idle wells are a concern of all State oil and gas regulatory agencies and should be a concern of the entire nation both from a future potential production standpoint and a future liability standpoint.

It is obvious that states are already beginning to address the liability concerns of idle wells. More emphasis must be placed on potential future production from idle wells to ensure this nation's energy future. I commend the United States Department of Energy for undertaking this project.

While it is not possible to thank every person who contributed information for this report, I would like to thank Bill Guerard of California and Jerry Sexton of New Mexico for their time consuming efforts on the editing committee.

Sincerely,

D. MICHAEL WALLEN, DIRECTOR
Kentucky Division of Oil and Gas
Chairman Idle Well Subcommittee

DMW/jme

**IDLE WELL SUBCOMMITTEE MEMBERSHIP
COUNCIL OF STATE REGULATORY OFFICIALS**

<u>Member</u>	<u>Affiliation</u>	<u>City and State</u>
D. Michael Wallen, Chairman	Department of Mines & Minerals	Lexington, KY
Samuel Alguire	Michigan Geological Survey	Lansing, MI
Lawrence E. Bengal	Oil & Gas Division	Springfield, IL
Bill Guerard	Dept. of Conservation	Sacramento, CA
A. Richard Henderson	State Oil & Gas Board	Jackson, MS
Steven Korf	Oil & Gas Conservation Division	Wichita, KS
Donald L. Mason	Dept. of Natural Resources	Columbus, OH
Michael W. Schmidt	Oil & Gas Conservation Division	Oklahoma City, OK
Jerry T. Sexton	Oil Conservation Division	Hobbs, NM
Gregory H. Sovas	Dept. of Environmental Conservation	Albany, NY
James W. Walker, Jr.	Texas Railroad Commission	Austin, TX

Federal Observers

Jerry Ham	U.S. Department of Energy Metairie Site Office	New Orleans, LA
Bill Hochheiser	U.S. Department of Energy Office of Fossil Energy	Washington, DC
Nancy Johnson	U.S. Department of Energy Office of Fossil Energy	Washington, DC
Hank Szymanski	U.S. Department of the Interior Colorado State Office	Lakewood, CO
Rudy Baier	U.S. Department of the Interior Bureau of Land Management	Tulsa, OK

National Laboratory

David Northrop	Sandia National Laboratory	Albuquerque, NM
--------------------------	--------------------------------------	-----------------

Industry Observers

Debra Eno	Amoco Production Company	Houston, TX
Bill Freeman	Shell Oil Company	Houston, TX
John Johnston	Robinson & McElwee	Charleston, WV

Interstate Oil and Gas Compact Commission Staff

W. Timothy Dowd	Executive Director	Oklahoma City, OK
Jerry R. Simmons	Associate Director	Oklahoma City, OK
Robert V. Cooper, Jr.	Associate Director	Oklahoma City, OK
Nancy L. Howeth	Associates' Assistant	Oklahoma City, OK

I.

EXECUTIVE SUMMARY

The Interstate Oil and Gas Compact Commission (IOGCC), under contract with the U.S. Department of Energy (DOE), has completed a study of idle oil and gas wells in the United States. DOE determined that it would be beneficial to ascertain the resource available from these wells, both as primary producers and for use in enhanced recovery operations, and encourage states to exchange ideas on approaches being used to address these wells. As defined by the IOGCC for this study, an idle well falls under one of the following:

- 1) A well that has been drilled since a state's regulatory program was established, is not producing or injecting, and has received state approval to remain idle (sometimes known as temporary abandonment);
- 2) A well that has been drilled since regulation, not producing or injecting, and has not received state approval to remain idle and for which the operator is known and solvent; or
- 3) A well that has been drilled since regulation, is not producing or injecting, has not received state approval to remain idle, and for which the operator is unknown or not solvent (also known as orphaned wells).

States are actively pursuing means to bring into compliance wells that have not received approval to remain idle, where the operator is known and solvent.

Wells drilled prior to the commencement of current state regulatory programs are not included in this report, unless they were subsequently brought under regulation or program purview.

A survey was utilized to query the producing states about their regulatory authority to regulate idle wells, security or financial assurance requirements, state plugging funds, temporary abandonment procedures and technical requirements, production potential of idle oil and gas wells, as well as environmental concerns related to idle wells, and statistical information on various categories of producing and idle wells. All oil and gas producing states were included in the survey, with the exception of Maryland and Oregon, which had 7 and 19 producing gas wells in 1990, respectively.

Of the 3,263,000 wells drilled since the inception of current state regulatory programs or subsequently brought under regulation, the current status of these wells is as follows:

Producing or injecting wells:	1,033,000
Plugged and abandoned wells:	1,895,000
Wells converted to UIC Class II from producing:	120,000
Wells idle with state approval:	147,000
Wells idle without state approval where the operator is known:	18,000
Wells idle without state approval where the operator is unknown or insolvent:	50,000

The oil and gas producing states maintain an active interest in the disposition and updated status of the estimated 215,000 idle oil, gas, and injection wells in the United States. This interest can be described in three primary areas:

- Resource Conservation
- State Revenue and Liability Implications
- Environmental Protection

Idle wells can provide access to potentially substantial volumes of oil and gas left in a reservoir through conventional or enhanced recovery methods, as well as provide access to reservoirs with resources unrecoverable at current prices or existing technologies. To varying degrees, the states are also dependent upon oil and gas production for budget revenues, or to specifically fund their oil and gas conservation programs, and idle wells may provide future revenues if production is resumed or enhanced. In addition, the states are concerned about the potential liability of idle wells, particularly any liability a state may incur for well plugging and abandonment. States have adopted procedures to acquire more complete information on idle wells and ensure environmental safety. As the states recognize the potential liability, they are taking steps to improve their regulatory programs and bring older producing wells into full compliance with state security, financial assurance, and technical procedures. When such wells are found, they are brought under state programs and regulations.

The IOGCC has made a series of recommendations to the states as the result of this project, which are found in Section V; they are summarized as follows:

- (1) States should continually evaluate the financial responsibility mechanisms most appropriate for the state, and implement changes when necessary to provide assurance for plugging. States should also consider the expansion of programs to bring nonsecured wells, which may be exempt under some state statutes, under some type of financial responsibility.
- (2) States should consider establishing procedures whereby an operator demonstrates a bona fide future use of an oil or gas well when seeking approval to allow a well to remain idle, and to require testing to ensure stability of the well during the period of idle status.
- (3) States should periodically review their funding mechanisms to plug and abandon orphan and preregulatory wells to ensure that funds remain adequate.
- (4) States should establish a priority list for plugging and abandoning orphan and preregulatory wells under a state plugging fund.
- (5) States should have a streamlined procurement procedure in the bid process for plugging and abandoning wells using either security forfeiture or plugging funds.
- (6) States should have adequate enforcement mechanisms to ensure compliance with state financial responsibility and temporary abandonment regulations, including sufficient funding and staffing.
- (7) States should consider seeking authority to permit the state or contractor to salvage equipment on a well site once the plugging and abandonment procedures have been completed to offset costs of plugging incurred by the state.
- (8) States should develop or continue to develop an adequate data management system for well tracking and identification.
- (9) Where practical to conserve oil and gas resources, states should examine and undertake innovative approaches to ensure the proper maintenance of the wellbore of an orphan well so that it could remain available for a bona fide future use without posing an environmental problem.
- (10) States should continue to keep up with new technologies, innovative approaches, and evolving trends in both government and industry, and make program modifications or seek new authorities when necessary.
- (11) The IOGCC recommends that states continue involvement in future efforts to study idle oil and gas wells.

II.

INTRODUCTION

The number of idle wells in the United States appears to be increasing. While many of these wells are in a state of transition (e.g., waiting for pipeline connection), a significant number of wells are idle due to: 1) the natural production decline and low crude oil and natural gas prices which resulted in many wells being uneconomic to produce; 2) the need for more sophisticated recovery techniques; and 3) the growing number of operators who are in financial trouble or have gone out of business altogether.

In 1991, the U.S. Department of Energy (DOE) determined that it would be beneficial to ascertain the status of idle wells nationwide, particularly in view of the oil and gas resources that may be available from these wells (both as primary producers and for use in enhanced recovery operations), and encourage states to exchange ideas on approaches being used to address idle wells. Subsequently, DOE requested the Interstate Oil and Gas Compact Commission (IOGCC) to conduct this study. (The IOGCC and the states, have an active interest in idle wells, agreed to undertake this effort.) The IOGCC is the organization of the Governor's of 29 oil and gas producing states and six associate member states with a primary interest in oil and gas conservation, including production and environmental issues surrounding conservation.

At the June 1991 Midyear Meeting, the IOGCC's Council of State Regulatory Officials (the oil and gas agency directors in the member states), established a subcommittee under the chairmanship of D. Michael Wallen, Director of the Oil and Gas Division for the Commonwealth of Kentucky, to assist the staff in the preparation of this report. At a meeting in Chicago on August 20, 1991, the subcommittee first met and outlined a program to complete the study by December 31, 1992.

Because of the significant variation of definitions among the states, the subcommittee for this study defined an idle well as:

- (1) A well that has been drilled since a state's regulatory program was established, is not producing or injecting, and has received state approval to remain idle (sometimes known as temporary abandonment);
- (2) A well that has been drilled since regulation, is not producing or injecting and has not received state approval to remain idle, and for which the operator is known and solvent;

- (3) A well that has been drilled since regulation, is not producing or injecting, has not received state approval to remain idle, and for which the operator is unknown or is not solvent (also known as orphaned wells).

To ensure a comprehensive review, the subcommittee decided to survey the oil and gas producing states. Survey questions included requests for information on the number and status of idle wells, statutory authority, security and financial assurance, plugging, conditions under which a well is allowed to remain idle, technical requirements, data management, and energy and environmental concerns.

A draft survey, as prepared by the IOGCC staff, was completed by four states, and then revised as needed by the subcommittee and distributed to the oil and gas producing states. The subcommittee reviewed the survey results in March 1992, and follow-up inquiries were sent to each state. After review of the supplemental material, staff prepared a draft report that was then reviewed and corrected by an editing committee. The draft report was then submitted to the idle well subcommittee membership and observers for comment, as well as to state officials who submitted information on the survey to ensure accurate interpretation of the data and programs.

Data requested for idle wells were to be collected from the inception of each state's regulatory program. After considerable discussion, the decision was made to exclude from the study those wells drilled, plugged, and abandoned prior to regulation (preregulatory wells) and not subsequently brought under the state regulatory program. For the first half century after commercial oil production began in 1859, few regulations for oil and gas wells were in place, although some requirements were implemented to protect drinking water supplies and to plug depleted wells. No regulations requiring drilling permits were in place, so there are few records of well locations, depths, or construction designs. As a result, states cannot accurately estimate the number of preregulatory wells or identify their locations; most have been buried and identification of the location is impossible.

For the most part, experience demonstrates that unlocated preregulatory wells constitute a negligible risk to safety and the environment 80 to 130 years later, particularly as these wells were typically drilled to shallow depths and reservoir pressures are now depleted. Although the population of preregulatory wells may be substantial, very few health, safety, or environmental problems associated with these wells are reported in any given year. When these problems occur, states generally have mechanisms to address them.

III.

STATE SUMMARIES

A. STATUTORY AUTHORITY AND DEFINITIONS

States use a variety of statutory authorities and regulatory mechanisms to address idle wells ranging from specific authority on idle wells to those broadly applicable to the regulation of oil and gas wells in general. The states generally view those authorities as adequate to address idle wells.

Specific information from the individual states was requested concerning the date of establishment of the state regulatory program, the authorities used to regulate idle oil and gas wells, including statutory authority, statutory or regulatory definitions, and changes or improvements in programs. While the IOGCC provided definitions for "idle wells" for purposes of this study, state definitions for wells that might be included in this category vary. A synopsis of this information is included in this section.

Other agencies involved in the regulation of idle wells are noted. A number of states have Underground Injection Control (UIC) programs administered by the Environmental Protection Agency (EPA), although those are not enumerated. In such cases, idle injection wells used for enhanced oil recovery and water disposal would be under the jurisdiction of EPA.

Alabama

The State of Alabama began the regulation of oil and gas wells in 1945 through legislation that established the Oil and Gas Board. That Act provided the Board authority to regulate oil and gas wells, protect groundwater, and provide for plugging, abandonment, and bonding. State Oil and Gas Board regulations were promulgated effective October 1, 1946, to regulate these activities. Section 9-17-6 of the Code of Alabama provides for regulation of oil and gas wells by requiring the "drilling, casing, and plugging of wells to be done in such a manner as to prevent the escape of oil and gas out of one stratum to another", and "to prevent the pollution of fresh water supplies by oil, gas, or salt water."

Alabama defines an abandoned well as a well that has not been used for six consecutive months and cannot be operated, whether it is a dry hole or production has ceased, or operations have not been conducted, or for other reasons. A temporarily abandoned well is defined as a well currently not producing oil and/or gas, but has been approved for future utility by the supervisor.

Alaska

The Alaska Oil and Gas Conservation Commission began their regulation of oil and gas wells in 1958. No specific statute is granted to regulate idle wells; however, Alaska statutes do provide the Commission with the authority over all wells drilled for exploration and production of oil and gas on state lands. Plugging and abandonment regulations began in 1958 and were amended in 1986. Provisions for groundwater protection began in 1984. Bonding requirements were also amended in 1986.

Alaska approves the suspension of well operations if a well encounters hydrocarbons of a sufficient quality and quantity to indicate the well is capable of producing in paying quantities, or it is demonstrated the well has a future value as a service well. Reasons for suspension include: surface production and resource marketing facilities are unavailable; security maintenance of a completed well in a shut-in status is inappropriate; and pool delineation and evaluation is necessary, or production awaits design delivery instruction of production and market outlets. A well shut-down is permitted if climatic, operational, or environmental concerns prevent the continuation of the program approved on the drilling permit or for rig substitution. This shut-down does not establish a completion, suspension, or abandonment date for the well. If well operations are not resumed within 12 months, the operator is required to abandon the well. An abandoned well is defined as a well that has been plugged as required by the state regulations.

Arizona

The Arizona Oil and Gas Conservation Commission was established in 1959 to administer the Conservation Act of 1951, which was expanded in 1978 to include regulation of enhanced recovery, disposal, and storage wells. As of July 1991, the Arizona Geological Survey provides staff support to the Commission to administer and enforce the laws relating to the conservation of oil and gas. Rules promulgated pursuant to statutory authority are reviewed every five years and new rules are adopted, old rules repealed, and existing rules amended as necessary to be consistent with applicable federal law, and to account for technological advances and currently accepted practices in the regulated industry. Arizona defines an idle well as a well that is not producing and can either be shut-in or temporarily abandoned. A temporarily abandoned well is a completed well that is shut-in and may or may not be capable of production. An abandoned well is a well that is nonproductive, unprofitable, and cannot be put to beneficial use.

Arkansas

The State of Arkansas began the regulation of oil and gas wells in 1939, and its regulations received significant revision in 1983 to include bonding or a letter of credit for security purposes. Arkansas defines an abandoned well as a well that has been plugged and abandoned according to the rules and regulations of the Arkansas Oil and Gas Commission, and defines a temporarily abandoned well as a well that has not produced in a year or more.

California

The State of California began its regulatory program, which included plugging and abandonment procedures, in 1915. A groundwater protection component was added in 1929. In 1931, the first well-bonding requirements were established. In addition, revisions to update/enhance the statutes and regulations have occurred throughout the history of the regulatory program.

California recognizes several types of idle wells: 1) idle, deserted — the operator is defunct and the well poses no apparent threat to health and safety; 2) suspended well — all required plugs in the well are in place, except for a surface plug; 3) shut-in — the well is temporarily not producing or injecting due to economics or operational problems; 4) hazardous, idle-deserted — the operator is defunct and the well poses a threat to the health or safety of humans, animals, or the environment; and 5) a long-term idle well, which is subject to bonding or \$100 annual fee, is one that has not produced or been used for injection purposes for six continuous months during a five-year period. California defines an abandoned well as a well properly plugged, with the site location restored, and all reports filed.

Colorado

The Colorado Oil and Gas Conservation Commission began the regulation of oil and gas wells in 1951. Its statutory authority grants all powers, including the regulation of borehole construction and abandonment procedures. Recent revisions include: shut-in and temporary abandonment rules added in 1988; a Memorandum of Agreement with the Water Quality Commission in 1990; and the establishment of the Environmental Response Fund in 1991. Colorado defines a shut-in well as a well that is cased or left in such a manner as to prevent the migration of oil, gas, water, or other substance from the formation or horizon in which it originally occurred, for a period not to exceed six months. An abandoned well is defined as a well properly plugged, and the site location restored and all reports filed.

Florida

The State of Florida began regulation of oil and gas wells in 1946 and has made revisions to its regulations in 1962, 1972, 1981, and 1989. Groundwater protection and plugging and abandonment procedures also began in 1946. The state uses definitions for shut-in, plugged and abandoned, and temporarily abandoned wells that are in general use in the oil industry.

Illinois

The Illinois Oil and Gas Act was adopted in 1939 and authority to regulate idle wells is given to the Department of Mines and Minerals by that Act. It gives the Department the power to define idle wells, orphaned wells, and temporarily abandoned wells. While the Act generally specified the protection of groundwater, surface casing requirements were not implemented until 1984 and plugging requirements, while having changed since the adoption of the Act, have been in place since the passage of the Act in 1939.

No significant revision occurred to that Act until 1988 when authority for regulation of oil and gas wells was removed from the State Mining Board and given to the Director of the Department of Mines and Minerals. In 1989, the Division of Oil and Gas was given enforcement authority in the form of administrative orders in the issuance of civil penalties for violations. Bonding requirements of wells were eliminated in 1990 and replaced with a yearly operator's fee paid to the state plugging and restoration fund. The temporary abandonment plugging rules and mechanical integrity testing rules for Class II wells were adopted in 1990, as well as revised permitting requirements for production and Class II wells and revised rules for operations and construction of those wells.

Illinois defines an idle well as a well that has been inactive for over two years and which has not been temporarily abandoned in accordance with state rules. A temporarily abandoned well is a well that has been inactive for over two years and has been temporarily abandoned in accordance with state rules. An orphaned well is defined by statute as a well that has been inactive for over two years, does not have a bond or has not paid in accordance with the annual fee assessment, and for which an owner cannot be located or is insolvent.

Indiana

The State of Indiana began the regulation of oil and gas wells in 1947. The statutes provide for placing a well in temporary abandoned status, enabling the Division to require (after two years) that wells be plugged, recased, or demonstrate mechanical

integrity. Significant revisions were made in 1985 for bonding purposes, as well as the UIC program.

Kansas

Some plugging authority was in place in 1933, although, for practical purposes, the regulation of oil and gas wells began in 1935. Groundwater protection regulations that related to injection wells or ponds were in place in 1935. These regulations were enforced by the Kansas Department of Health and Environment through 1986, and by the Kansas Corporation Commission since that date. Plugging and abandonment procedures were also in place in 1935, but were revised and expanded in 1982. The Corporation Commission has the statutory authority, under Chapter 55 of the Kansas Statutes, to cause operators to plug abandoned wells and to remediate or repair abandoned wells prior to plugging. The Commission can direct an order to any party having physical control of the well during its existence.

The Oil and Gas Conservation Division defines a shut-in well as a well in a state of nonproduction due to: 1) a lack of pipeline connection; 2) being under a Commission noncompliance order; or 3) the completion of an allowable over-production penalty for a period under a proration order. A temporarily abandoned well is defined as a well where an application has been made to the Commission and approved for this status with the intention of saving the well for future production or injection use. An abandoned well includes any well that has not been plugged and abandoned properly under regulation, and where there is no identifiable owner or current lease ownership has denied the intention to include the well in production plans. While no official definition exists, the Commission views an idle well as a well that is temporarily not pumping due to a correctable malfunction or by operator choice.

Kentucky

The Commonwealth of Kentucky began the regulation of oil and gas wells in 1960, and the Kentucky Revised Statutes gives the Division of Oil and Gas the authority to require wells to be drilled, cased, and plugged in a manner to prevent waste, blowouts, cavings, seepages, and fires, and to protect correlative rights. Groundwater protection regulations began in 1978 through an administrative regulation for protection of freshwater zones, and for plugging and abandonment procedures in 1961, including regulations for wells drilled through both noncoal-bearing strata and through coal-bearing strata. Bonding requirements and penalty provisions were established in 1966 and increased in 1990. Kentucky defines an idle well as a well that is equipped but not in production. A temporarily abandoned well is defined as a well shut-down for good cause as determined by the state. An improperly abandoned well is a well that is neither producing nor plugged.

Louisiana

Regulation of oil and gas wells began with the adoption of Order No. 29 in 1941, and groundwater protection and plugging and abandonment procedures were in place with the adoption of that Order. Revisions occurred to the plugging and abandonment regulations in 1974, and to groundwater protection with the adoption of pit regulations in 1986. No official definition for an idle well, a temporarily abandoned well, or an abandoned well exists.

Michigan

In 1927, Act No. 65 of the Michigan legislature created the Office of the Supervisor of Wells and provides for the issuance of permits and regulation of drilling. The Act also required casing and sealing of each freshwater, brine, oil or gas formation. Plugging requirements were also introduced in 1927. Specific regulations concerning the power to regulate idle wells occurred in 1939, allowing the Supervisor of Wells to require the locating, drilling, deepening, redrilling, or casing reopening, sealing, operating, and plugging of wells drilled for oil or gas disposal, and to prevent pollution damage to freshwater by such methods and means that no unnecessary damage to underground resources, neighboring properties, or rights to life will result.

A shut-in well is defined as a well economically producible and shut-in for non-compliance, mechanical problems, or awaiting pipeline for gas sales. A temporarily abandoned well is defined as a well that has received permission from the Supervisor of Wells to remain unplugged for more than 12 consecutive months. An abandoned well is a well that has not produced for more than 12 consecutive months, or a dry hole left unplugged for more than 60 days. "Orphaned well" is applied to a well abandoned illegally by a former operator that is no longer doing business in the state, and/or no bond is in place to cover plugging, but is not defined statutorily.

Mississippi

Regulation of oil and gas wells in Mississippi began in 1948 with the establishment of the Oil and Gas Board. Section 53:1-17 of the Mississippi Code gives the Board jurisdictional authority to enforce all laws relating to the conservation of oil and gas. Statewide rules were adopted in 1951, and the plugging rules, initially adopted in 1948, were revised in 1981. Groundwater protection rules, initially adopted in 1948, were revised in 1981 and 1989. Requirements for the financial responsibility of operators were established in 1992. Mississippi defines an idle well as an inactive well and an abandoned well as one that has been plugged and abandoned.

Missouri

Missouri began the regulation of oil and gas wells in 1966. Regulations for groundwater protection, plugging and abandonment, and bonding were also established in 1966 and have since been revised on several occasions. A temporarily plugged well is defined as a well with a surface plug or cap, when the well operation ceases for a period of 90 days, and extensions may be granted every six months, up to two years. An abandoned well is defined as a well with a permanent plug in accordance with the oil and gas regulations.

Montana

The regulation of oil and gas wells in Montana began in 1953 with the latest revisions implemented in 1987. Proposed rules pertaining to bonding and the classification or requirements for shut-in and temporarily abandoned wells are being held for further discussion and study. The statutes give the Montana Board of Oil and Gas Conservation the authority to regulate the drilling, casing, and producing and plugging of wells in a manner to prevent waste or pollution. No definitions are established for the terms "idle well", "abandoned well", or "temporarily abandoned well".

Nebraska

The present Oil and Gas Conservation Act for the regulation of oil and gas was adopted in 1959; however, the first regulations that gave authority to the Geological Survey were adopted in 1940 and updated in 1956. The Commission, by Section 507-905 (3) of the Nebraska Revised Statutes, gives the Commission the authority to require drilling, casing, operating, and plugging of wells in such a manner as to prevent: 1) the escape of oil or gas out of one stratum into another; 2) the intrusion of water into oil or gas strata; 3) the pollution of freshwater supplies by oil, gas, or saltwater; and 4) the prevention of blowouts, cave-ins, seepages, and fires.

Nevada

The regulation of the oil and gas industry in Nevada began in 1954. The Department of Minerals was created in 1983 and given the responsibility to regulate oil and gas activities. Groundwater protection and plugging and abandonment procedures also began in 1954. The oil and gas regulations have been amended twice — once in 1976 and once in 1987. The Department of Minerals has been given the authority to require the plugging of wells in such a manner as to prevent the escape of oil or gas, as well as a reasonable bond for plugging purposes.

New Mexico

The Oil Conservation Commission was created in 1935, along with the regulations for groundwater protection and plugging and abandonment. Specific to plugging and abandonment and groundwater protection, the Conservation Division has been given authority to require dry or abandoned wells to be plugged in a way that confines the oil, natural gas, or water to the strata in which they are found, and spend the oil and gas reclamation fund and do all acts necessary to plug dry or abandoned oil and gas wells in accordance with the provisions of the Oil and Gas Act, including the disposition of salvageable equipment and material removed from wells being plugged by the state. Significant revisions include the requirement that oil producing pools with water-driven reservoirs be required to dispose of water into disposal wells in 1957, the elimination of pit disposal in 1967, and adoption of a program similar to the UIC Program in 1977 to evaluate and permit waterfloods and disposal wells within an area of review.

A shut-in well is defined by New Mexico as a well that has not produced oil or gas for up to one year. A temporarily abandoned well is defined as a well that has had an approved mechanical integrity test on the casing; a well may be approved for temporary abandonment by the regulatory body for up to five years. An abandoned well is a well that has an approved amount of cement and mud to prevent the migration of fluid in the wellbore from total depth to surface.

New York

While current requirements for the regulation of oil and gas wells in the State of New York were put in place in 1963, especially with regard to groundwater protection and bonding procedures, statutes that required wells to be plugged and abandoned were in place as early as 1879. The Environmental Conservation Law gives the Division of Mineral Resources the authority to enter, take temporary possession of, plug or replug any abandoned well when an owner or operator neglects or refuses to comply with the rules and regulations. The rules and regulations also make it unlawful to shut-in or temporarily abandon a well for more than one year or 90 days, respectively, without Department approval.

A shut-in well is defined as a well capable of production and closed down temporarily for repairs, testing, or lack of market. A temporarily abandoned well is one in which operations have been discontinued or the well has been closed in without plugging and abandonment operations. An abandoned well is defined as any unplugged well shut-in for more than one year without Department approval and whose ownership may or may not be known.

North Dakota

Oil conservation laws and rules were enacted in the State of North Dakota in 1941, although oil itself was not discovered within the state until 1951. Significant changes since that time include increased bond amounts in 1961; the abolition of the use of earthen pits for produced water storage in 1969; monitoring the disposal of drilling pit fluids in 1982; the requirement of mechanical integrity testing for temporarily abandoned wells in 1990, as well as other bond increases. A temporarily abandoned well is defined as a well that has been approved for such status (upon application) for one year. An abandoned well is defined as one that has had the equipment removed or when oil or gas has not been produced for one year.

Ohio

Current regulatory authority in the State of Ohio was established with the creation of the Division of Oil and Gas in 1965; however, the first oil and gas law regulating methods used to case and plug oil and gas wells to prevent water from penetrating and contaminating oil and gas bearing rock was enacted in 1883. Plugging and abandonment procedures and groundwater protection were established with the creation of the Division of Oil and Gas. The Division of Mines of the Ohio Department of Industrial Relations oversees and supervises plugging operations that are located in a coal-bearing township. Significant revisions to the statutes include the required restoration of lands disturbed after drilling and plugging a well (1974); permit issuance, well construction, and monitoring and reporting requirements (1982); the elimination of brine storage pits and the establishment of standards to define contamination of water supplies (1985); and the amendment of annular disposal rules (1990).

An idle well is defined as a well incapable of production. A temporarily abandoned well is a well for which permission has been given to delay plugging. An abandoned well is defined as a well that has been deserted.

Oklahoma

The Oil Conservation Division of the Oklahoma Corporation Commission was given exclusive jurisdiction over all wells drilled for exploration and production of oil and gas in 1915. Regulation for groundwater protection and for plugging and abandonment procedures began in 1917.

Oil and Gas Division policy defines an idle well as one that has produced and is still capable of production, but which has been taken out of service for economic or other reasons with the intent to be placed back into production when conditions justify.

A temporarily abandoned well is defined as an idle well placed in an environmentally safe condition by setting of a bridge plug to ensure the producing zones' reservoir fluid in the wellbore remains below the base of treatable water, and the wellhead has been properly secured with the intent to place the well back into service. Division policy also defines an abandoned well as either a past producer or a dry hole that is unplugged and has been abandoned with no intent to be placed back on production or utilized further.

Pennsylvania

Legislation regarding the plugging and abandonment of oil and gas wells in the Commonwealth of Pennsylvania began in 1955. Groundwater protection laws were established in 1985, and bonding legislation was established in 1985 and amended in 1986 and 1992. Pennsylvania defines an abandoned well as one that has not been used to produce, extract, or inject gas, petroleum, or other liquid within the preceding 12 months, a well for which the equipment necessary for production, extraction, or injection has been removed, or a well considered dry and not equipped for production within 60 days of drilling. However, the term does not include wells granted inactive status.

South Dakota

The regulation of oil and gas wells in South Dakota began in 1939, with groundwater protection and plugging and abandonment regulations beginning in 1943. Enhancement of the groundwater regulations occurred in 1960 and 1967; regulations for plugging and abandonment were enacted in 1960 and 1974, accompanied by appropriate increases for plugging and for surface restoration. South Dakota statutes give the agency the authority to regulate the drilling and plugging of wells, and all other operations for the production of oil or gas. South Dakota defines a temporarily abandoned well as one with production casing that has been approved for temporary abandonment for a period not exceeding six months unless an extension is granted by the secretary of the Department.

Tennessee

In 1968, the State of Tennessee began the regulation of oil and gas wells, including plugging and abandonment procedures. Groundwater protection rules came into place in 1972. Improvements to the program since that time include regulations to limit the blanket bond to ten wells in 1987, and additional changes to the bonding provisions in 1988. No definitions are provided by statute or rule for idle or abandoned wells.

A temporarily abandoned well is a well for which drilling has ceased for 30 days or production has ceased.

Texas

The Railroad Commission of Texas was given authority in 1917 for the regulation of oil and gas wells. Rule 20, for groundwater protection, was initiated in 1919. Plugging and abandonment procedures were initiated through statewide Rules 10 (b), 13, and 23 in 1933. General authority over the regulation of idle wells is included in Chapter 9 of the Texas Oil and Gas Conservation Laws and statewide Rule 14. Additional significant revisions include changes in the bonding program that were initiated in 1983 and 1991. No definition is provided for an idle well. An abandoned well is defined as a well that is not being operated, and a temporarily abandoned well is defined as a well that is currently not in service.

Utah

Regulation of oil and gas began in the State of Utah in 1955, including regulations for groundwater protection and for plugging and abandonment. Authority for drilling, operating, producing, and plugging wells is found in the Utah Code Annotated, Section 40-6-1. In 1983, revisions occurred to the Code to increase the regulatory responsibility for groundwater protection, site reclamation, well plugging, and increased bond amounts. An idle well is considered as a shut-in oil, gas, or water-injection well. An abandoned well is defined as a well no longer in use, whether a dry hole or one that has ceased production, or for some other reason cannot be operated. A temporarily abandoned well is a well that has been completed, is not capable of production in paying quantities, and is not being presently operated.

Virginia

Statutory standards were first enacted in 1948. The regulatory program began in 1950, along with the creation of the State Oil and Gas Board. The Department of Mines, Minerals and Energy was created in 1985. The Virginia statutes give specific authorities for the abandonment or cessation of a well and the orphan well program. Specific protection for groundwater and for the plugging and abandonment procedures were established in 1950. The Virginia Gas and Oil Act was passed in 1990, and subsequent regulations were finalized in 1991. No definitions are provided for an idle well, abandoned well, or temporarily abandoned well; however, the term shut-in is used for wells that are not producing for good cause, such as economic conditions or operating problems. The statutes define an orphaned well as a well abandoned prior

to July 1, 1950, or a well for which no records exist concerning drilling, plugging, or abandonment.

West Virginia

The State of West Virginia began the regulation of oil and gas in 1929, and plugging and abandonment procedures were included in that legislation. Groundwater protection legislation was passed in 1969 and revised in 1991. The West Virginia Abandoned Well Act, discussed in Section IV of this report, was passed in 1992. The state defines an abandoned well as any well that is completed as a dry hole or has not been in use for 12 consecutive months, or has not shown any bona fide future use. For purposes of the Abandoned Well Program, even though "orphaned well" is not a defined term in the statute, it is considered to be a well having no production reported to the state since 1984, having no affidavit on file showing total plugging, and is not identified as a storage, secondary recovery, or disposal well in the oil and gas data system.

Wyoming

Regulation of oil and gas under the current program in the State of Wyoming began in 1951. Revisions include: 1) the Underground Injection Control program in 1981; 2) pit regulation revisions in 1984 and 1992; 3) changes in 1982 and 1991 to rules governing plugging of shallow seismic holes; and 4) bonding revisions in 1992. Wyoming Statutes 30-5-104 created the Oil and Gas Conservation Commission and gives authority to, among other things, require the drilling, casing, or plugging of wells in such a manner as to prevent the escape of oil or gas from one stratum into another and the pollution of freshwater supplies by oil, gas, or salt water, and to use funds collected under Wyoming Statutes 30-5-116 (conservation tax) to plug wells and reclaim the surrounding area under the State Plugging fund. A dormant well is a well that is no longer actively producing, monitoring, or injecting, or which does not qualify as a permanently abandoned, shut-in, or temporarily abandoned well. Temporarily abandoned wells are those in which the completion interval has been isolated from the wellbore above and the surface. A permanently abandoned well is one that is no longer active and has been permanently plugged and abandoned. Shut-in wells are those wells not currently considered active in which the completion interval has not been isolated from the wellbore above.

B. SECURITY OR FINANCIAL ASSURANCE

The primary purpose of security or financial assurance requirements in place in the producing states is to ensure proper plugging and abandonment of oil and gas wells. These security or financial assurance requirements have been based upon estimated plugging costs. Most states have made recent changes to upgrade their security and financial assurance requirements; some have begun to charge annual fees in lieu of, or in addition to, routine security or financial assurance requirements.

The majority of oil and gas producing states require specific security or financial assurance in the form of a surety bond, cash, certificate of deposit, or irrevocable letter of credit. The security or financial assurance can be to assure performance, plug the wellbore at time of abandonment, restore the surface, or a combination of the above. While there has been a great variance among states in the date security or financial assurances were established, states that have begun production more recently have required security or financial assurance from the inception of their programs. Of the 28 states requiring security, all allow surety bonds, 24 allow the use of certificates of deposit, 23 allow cash, and 9 allow the use of a letter of credit. The State of Utah also allows the acceptance of negotiable U.S. Bonds, and the State of Oklahoma allows a financial statement with a minimum of \$50,000 net worth in the state.

Single well bonds range from \$500 for wells of depths of 500 feet and under in Kentucky, to a minimum of \$100,000 per well in Alaska. Nine states set the amount by depth (Alabama, California, Illinois, Kentucky, Missouri, New Mexico, New York, Utah, and Wyoming). Single well bonds in Oklahoma are established by a licensed plugger (pluggers who are permitted to bid on state contract plugging are licensed by the Corporation Commission after review of their qualifications), although the blanket bond amount is a set dollar amount. Blanket bonds range from \$10,000 (Montana, Tennessee, and wells of depths less than 1,000 feet in Utah), to a \$200,000 minimum in Alaska, \$250,000 for offshore wells in California, \$250,000 for more than 100 wells in Texas, and \$1,000,000 in Florida.

Two states, California and Illinois, do not maintain their individual bonds for the life of the well — rather, they are completion bonds. The bonds in California are released after a successful completion, which is defined as six months continuous production, or approved plugging and abandonment; therefore, many wells in that state are not subject to well bond coverage. Bonds are held in the State of Illinois for two years, and if the operator is not in violation of the Illinois Oil and Gas Act, the bond is released and the operator is required to contribute an annual fee (based on the total number of wells owned by the operator) to the state plugging fund. Failure to pay the fee results in the issuance of a cessation order of all production for that operator.

Six states have developed programs in addition to the routine security requirements that merit discussion. They are as follows:

California - Wells that have been inactive (not produced for six consecutive months) for five years or longer and are unbonded are charged \$100 per well per year under a program instituted in 1991.

Florida - The Petroleum Exploration & Production Bond trust fund is a mechanism for operators to obtain coverage if they are unable to obtain coverage elsewhere. The single well charge is \$4,000 for the first year, and \$1,500 thereafter. The blanket bond is \$30,000.

Pennsylvania - In 1985, Pennsylvania instituted a program for operators of not more than 200 wells who could not obtain bonds for wells drilled prior to April 18, 1985. This program permitted the submission to the Department of a fee of \$50 per well or a blanket fee of \$500 for 10-20 wells, or a blanket fee of \$1,000 for more than 20 wells. This fee is non-refundable and paid each year that the operator did not file a bond with the Department. The legislation was amended in 1992 to permit operators to make phased deposits of collateral to fully collateralize bonds. These bonds are fully refundable. An operator with up to 10 existing wells who does not intend to operate additional wells would deposit \$250 per well initially, and deposit \$50 per well annually until the obligations were met. An operator of 11-25 wells, or an operator of up to 10 wells applying for one or more permits for additional wells makes a deposit of \$2,000 and annually deposits \$1,150 plus \$150 for each additional well until the obligations are met. An operator of 26-50 wells deposits \$3,000 and annually deposits \$1,300 plus \$400 for each additional well to be permitted. Operators of 51-100 wells deposit \$4,000 and annually deposit \$1,500 plus \$400 for each additional well to be permitted. Operators of 101-200 wells deposit \$8,000 and annually deposit \$1,600 plus \$1,000 for each additional well to be permitted. Operators of more than 200 wells are required to fully bond their wells immediately. Operators who paid a fee in lieu of bond have that amount credited against the phased collateral payments.

Texas - To slow the growth in the numbers of abandoned wells and other oil field sites that must be addressed with state funds, S.B. 1103 of 1991 established new financial responsibility requirements for oil and gas operators. Anyone conducting oil and gas operations regulated by the Railroad Commission must file an annual organization report and, at the same time, must submit a bond or alternate form of financial security. This financial security covers all of the operator's oil and gas operations regulated by the Commission.

S.B. 1103 gives an operator the choice of several methods of satisfying this requirement. The options are:

- 1) If the operator's only operations are wells, a bond in an amount equal to \$2 per foot of the aggregate total depth of all of the operator's wells;
- 2) A blanket bond in an amount equal to:
 - a) \$25,000 if the operator has 10 or fewer wells or has no wells but performs other operations;
 - b) \$50,000 if the operator has 11 to 99 wells; or
 - c) \$250,000 if the operator has 100 or more wells;
- 3) If the operator can demonstrate an acceptable record of compliance with Commission safety and pollution prevention rules during the previous 48 months, an annual fee of \$100;
- 4) An annual fee of three percent of the amount of the bond that would otherwise be required;
- 5) A first lien on oil field equipment with a salvage value equal to the amount of the bond that would otherwise be required.

If an operator chooses to pay a fee or file a lien, rather than file a bond, the operator must also pay a fee of \$100 with each application for an extension of time to plug an inactive well.

As further incentive for compliance, S.B. 1103 prohibits the Commission from accepting a drilling permit application if the applicant or any other organization under common ownership or control has outstanding, finally determined violations of safety or pollution prevention rules that occurred within the preceding five years. A finally determined violation is considered outstanding unless the conditions that constituted the violation have been corrected and all associated penalties and costs have been paid.

West Virginia - The West Virginia Abandoned Well Act requires all wells to be bonded. For wells not bonded under the present \$5,000 per well or \$50,000 blanket bond, the state may suspend the financial requirements until July 1, 1995, if a hardship is demonstrated — two years beyond the statutory deadline of July 1, 1993. Alternatively, the state may require 20 percent of the bond amount to be supplied by July 1, 1994, with an additional 20 percent in each subsequent year until fully bonded by July 1, 1998.

Wyoming - An additional \$2.00 per foot bond may be required under the blanket bond when the total dormant well footage exceeds 12,500 feet. The supervisor may allow the additional bond to be paid on a percentage basis over eighteen months. The state must be notified prior to the transfer of wells to inform the new owner of any additional bonding to be required.

Three states, Kansas, Louisiana, and Mississippi do not require security in the above-stated manner. Kansas requires operators and drillers to be licensed prior to producing. Licensing operators is considered to be a form of financial assurance because it allows latitude to work with operators or totally shut down the production of an operator by suspending or revoking the license. Loss of production on all operated leases serves as a deterrent from defaulting on the responsibility to either plug or produce all wells. Louisiana statutes do provide for the Commissioner of Conservation to promulgate bonding rules and regulations, although none have been enacted. Recent legislation in Mississippi authorizes the Oil and Gas Board to require proof of financial responsibility for each well.

The majority of states permit the regulatory agency to change the bond amount by regulation. In New Mexico and Oklahoma, that authority is limited with flexibility on individual wells or within a range set by the legislature. The bond amounts in California, Indiana, Kentucky, New York, Texas, and West Virginia are established solely by the state legislature.

A number of states also require the filing of separate security or financial assurance for site restoration, or restoration is included in the plugging bond. The states of Alabama, Florida, New York, Pennsylvania, Utah and Virginia cover site restoration as an obligation of bond. Amounts for site restoration range from \$1,500 per well in Tennessee, to \$100,000 per lease or \$500,000 statewide in Alaska.

Some states have the authority to either place a lien on the surface equipment of a well if the operator fails to comply with the plugging regulations, or actually become the owner of the equipment. The states of Arizona, California, Illinois, Nebraska, Oklahoma, and Pennsylvania may file liens on abandoned equipment. In Kentucky, the state claims the property unless claimed by the lessee, although no liens can be filed. In Louisiana, prior to a sheriff's sale, the Commissioner of Conservation is notified, if appropriate, and that official may place a lien that can follow to a third party. No lien authority exists in Michigan although, in practice, the contractor removes the equipment as part of the cleanup, and may dispose of the equipment and credit the state for the value of the salvage. Equipment in North Dakota may be confiscated following a hearing after a well is plugged. In West Virginia, the party conducting the plugging operations or the surface owner may take the equipment.

No state has the authority to operate a well in lieu of an insolvent operator, or contract with a firm or individual to operate the well in lieu of plugging. Likewise, no state has its own equipment and crew for well plugging operations. All states contract to private operators for any plugging operations.

Once a state has determined that it has the responsibility to plug a well, various obstacles have been encountered along the path to closure. These obstacles may include: state procurement procedures, which make it difficult and time-consuming to obtain bids; resistance of landowners; limited access to the wellbore; and inability to quickly obtain surety funds.

A complete listing of plugging and restoration bond amounts follows as Table I.

TABLE I. STATE SECURITY OR FINANCIAL ASSURANCE REQUIREMENTS

<u>State</u>	<u>Security First Req'd./ Last Revision</u>	<u>Types of Security Permitted</u>	<u>Single Well</u>	<u>Blanket Bond</u>	<u>Can Regulatory Authority Change Amount</u>	<u>Separate Site Restoration Bond</u>	<u>Amount</u>
Alabama	1945/1976	Surety	\$5,000 to \$50,000 based on depth	\$100,000	Yes	No	Included in plugging bond
Alaska	1958/1986	Surety, CD	\$100,000 minimum	\$200,000 minimum	Yes	Yes	\$100,000 lease \$500,000 statewide
Arizona	1959/1992 Proposed	Cash, Surety, CD	\$5,000 [\$10,000 (< 10,000 ft) \$20,000 (> 10,000 ft. proposed)]	\$25,000	Yes	No	—
Arkansas	1983/1985	Cash, Surety, CD	\$15,000	—	Yes	No	—
California	1931/1977	Cash, Surety, CD	\$10,000 (0-5,000 ft) \$15,000 (5,000-10,000 ft) \$25,000 (> 10,000 ft) Released upon well completion	\$100,000 onshore \$250,000 offshore	No	No	—
Colorado	1951/1988	Cash, Surety, CD	\$5,000	\$30,000	Yes	Yes	For when mineral interest is severed from surface - \$2,000 to \$5,000
Florida	1946/1989	Cash, Surety, CD	\$50,000, \$100,000 Petroleum E&P Bond Trust Fund \$4,000 first year; \$1,500 per year after	\$1,000,000 \$30,000	Yes	No	Included in plugging bond

TABLE I. STATE SECURITY OR FINANCIAL ASSURANCE REQUIREMENTS

<u>State</u>	<u>Security First Req'd./ Last Revision</u>	<u>Types of Security Permitted</u>	<u>Single Well</u>	<u>Blanket Bond</u>	<u>Can Regulatory Authority Change Amount</u>	<u>Separate Site Restoration Bond</u>	<u>Amount</u>
Illinois	1939/1990	Cash, Surety, CD, Irrevocable Letter of Credit	\$1,500 (<2,000 ft) \$3,000 (>2,000 ft)	\$25,000 (0-25 wells) \$50,000 (26-50 wells) \$100,000 (more than 50 wells)	Yes	No	—
		Security now only required for new operators, and must be maintained for two years; released, and operator responsible for annual fee.					
Indiana	1947/1985	Cash, Bond, CD	\$2,000	\$30,000	No	No	—
Kansas	1982	Licenses operators, drillers, & pluggers; suspension or revocation of license causes shutdown of operator statewide until compliance restored.					
Kentucky	1966/1990	Cash, Surety, Letter of Credit, CD for second half of amount only	\$1 per foot; minimum of \$500	\$10,000	No	No	—
Louisiana	None	—	—	—	—	No	—
Michigan	1931/1977	Cash, Surety, CD Letter of Credit	\$5,000	\$50,000	Yes	No	—
Mississippi	1992	None, now requires proof of financial responsibility					
Missouri	1966/1989	Surety, CD, Letter of Credit	\$1,000 (0-500 ft) \$2,000 (501-1,000 ft) \$3,000 (1,001-2,000 ft) \$4,000 (2,001-5,000 ft) \$4,000 + \$1 per foot (>5,100 ft)	\$20,000 (0-800 ft) for maximum of 50 wells \$30,000 (800-1,200 ft) for maximum of 15 wells	Yes	No	—

TABLE I. STATE SECURITY OR FINANCIAL ASSURANCE REQUIREMENTS

<u>State</u>	<u>Security First Req'd./ Last Revision</u>	<u>Types of Security Permitted</u>	<u>Single Well</u>	<u>Blanket Bond</u>	<u>Can Regulatory Authority Change Amount</u>	<u>Separate Site Restoration Bond</u>	<u>Amount</u>
Montana	1954/1987	Surety, CD	\$5,000	\$10,000	Yes	No	—
Nebraska	1959/1984	Cash, Surety, CD	\$5,000	\$25,000	Yes	No	—
Nevada	1954/1976	Cash, Surety, CD	\$10,000	\$50,000	Yes	No	—
New Mexico	1953/1986	Cash, Surety	\$5,000 (< 5,000 ft) \$7,000 (5,100-10,000 ft)	\$50,000	No*	Yes	\$10,000 lease, \$20,000 blanket
New York	1963/1985	Cash, Surety, CD Letter of Credit	\$2,500 (< 2,500 ft) \$5,000 (2,500-6,000 ft) > 6,000 ft, anticipated plugging costs	\$25,000 to \$100,000 \$40,000 to \$150,000	No	No	Security covers plugging & restoration
25 North Dakota	1941/1990	Cash, Surety	\$15,000 Commercial disposal wells must single well bond	\$50,000 (10 wells) 100,000 (no limit) No \$100,000 Blanket Bond may have more than 10 unplugged dry holes and abandoned wells	Yes	No	—
Ohio	1963/1989	Cash, Surety, CD, Letter of Credit	\$5,000	\$15,000	Yes	No	—
Oklahoma	1922/1990	Surety, CD, Letter of Credit, Financial Statement	As established by licensed plugger	\$25,000 or \$50,000 net worth in Oklahoma for financial statement	No*	No	
Pennsylvania	1985/1992	Cash, Surety, CD, Fee-in-lieu for pre-act wells	\$2,500 Fee-in-lieu \$50 per well per year (1-10 wells) \$500 per year (10-20 wells) \$1,000 per year (> 20 wells)	\$25,000	Yes	No	Security covers drilling, plugging, water supply, replacement and restoration

TABLE I. STATE SECURITY OR FINANCIAL ASSURANCE REQUIREMENTS

<u>State</u>	<u>Security First Req'd./ Last Revision</u>	<u>Types of Security Permitted</u>	<u>Single Well</u>	<u>Blanket Bond</u>	<u>Can Regulatory Authority Change Amount</u>	<u>Separate Site Restoration Bond</u>	<u>Amount</u>
South Dakota	1943/1979	Cash, Surety, CD	\$5,000	\$20,000	Yes	Yes	\$2,000 per well, \$10,000 blanket
Tennessee	1968/1988	Cash, Surety, CD, Letter of Credit	\$2,000	\$10,000	Yes	Yes	\$1,500, reduced to \$1,000 after initial reclamation
Texas	1983/1991	Cash, Surety, Well fee	Annual fee range from \$200 to \$850 per well if not bonded	\$25,000 (1-10 wells) \$50,000 (11-99 wells) \$250,000 (100 or more)	No	No	—
Utah	1955/1983	Cash, Surety, CD, Letter of Credit, Negotiable U.S. Bonds	\$1,000 (< 1,000 ft) \$10,000 (> 1,000-< 3,000ft) \$20,000 (> 3,000-< 10,000 ft) \$40,000 (> 10,000 ft)	\$10,000 (< 1,000 ft) \$80,000 (> 1,000 ft)	Yes	No	Security includes plugging and restoration
Virginia	1955/1990	Cash, Surety, CD	\$10,000 plus \$2,000 per acre of disturbed land	\$25,000 (1-15 wells) \$50,000 (16-30 wells) \$75,000 (31-50 wells) \$100,000 (51 or more wells) For purposes of calculating blanket bond amounts, from one-tenth of an acre to five acres of disturbed land for a separately permitted gathering pipeline is equivalent to one well.	Yes for single well bonds only	No	Security includes plugging and restoration
West Virginia	1963/1992	Cash, Surety, CD, Letter of Credit, Consolidated investment fund	\$5,000	\$50,000	No	No	—
Wyoming	1951/1992	Cash, Surety, CD, Letter of Credit, Certified Check	\$5,000 (< 2,000 ft) \$10,000 (> 2,000 ft)	\$25,000 Additional amount may be required for dormant wells	Yes	No	—

*State has flexibility on individual wells or within range set by legislature

C. PLUGGING FUNDS AND WELL PLUGGING AUTHORIZATION

Most states have established mechanisms to ensure that wells for which no or insufficient financial assurance exists are properly plugged and abandoned. These plugging funds that have been established by the various states vary widely, both in scope and funding mechanisms. As these wells are identified, they are included on waiting lists established by the states and ranked for priority for plugging and abandonment. An idle well is not, per se, an environmental threat. Many wells are allowed to remain idle with approval of the state regulatory agency because they are not threatening the environment or public safety. Similarly, many wells on the various state waiting lists are not a threat to the environment or public safety.

The number of wells waiting to be plugged in individual states at any given time may depend on a variety of factors, such as the number of oil and gas wells within the state regulatory program, the adequacy of security or financial assurance provided by oil and gas operators, the availability of state plugging funds and staff resources, and state procurement procedures. Legal issues arising from involency can also delay plugging by either operators or the state.

Many states have wells waiting to be plugged for various reasons. Notable for different reasons are Kentucky, with an estimated 12,000, and Texas, with almost 2,000. Kentucky's large number occurs because the oil and gas agency has been given no statutory authority to impose administrative penalties on operators who violate the Commonwealth's statutes and rules. The only sanction that can be imposed is bond forfeiture. Prior to recent changes that strengthened financial responsibility, operators walked away from wells when they were no longer economically profitable, leaving the cost of plugging to the Commonwealth, aided in part by a bond that rarely or never covered plugging costs.

Kentucky, with approximately 33,000 producing wells, contrasts with Texas, with 240,000. In 1991, the Texas legislature and the Railroad Commission addressed the problem of an increasing number of wells on the waiting list with a new funding approach. Basically, this approach increased the well plugging fund from \$2,000,000 to \$10,000,000. In the other 29 reporting states, there are an estimated 7,000 wells waiting to be plugged. States with the largest number of wells waiting to be plugged are: Kentucky - 12,000; West Virginia - 4,000; Texas - 1,996; Ohio - 700 to 800; Illinois - 750 (the Illinois plugging program was initiated in 1991); Oklahoma - 600; and Pennsylvania - 377.

As of September 30, 1992, the states that have plugged the greatest number of wells under their respective programs are: Texas - 5,402 wells; Ohio - 1,127 wells; Kansas - 1,060 wells; Kentucky - 432 wells; Oklahoma - 292 wells; and California - 179 wells. Those states with significant fund expenditures under their programs, as of

September 30, 1992, are: Texas - \$21,858,000; Ohio - \$11,200,000; California - \$2,887,000; Kansas - \$2,475,000; Michigan - \$1,110,900; Oklahoma - \$889,000; and Kentucky - \$619,000.

A cautionary note should be mentioned regarding attempts to determine average plugging costs based upon the number of wells plugged and the amount of money spent. In many instances, the states have established priority systems for expenditures of monies under the plugging funds. High on any state's list are wells that are either causing or have the greatest potential to cause damage to the environment and/or public health. Such wells frequently are more costly to plug and abandon than a well that is in good condition. Therefore, any attempt to derive average costs from the figures made available in this study will be necessarily inaccurate and will not reflect true plugging costs.

Funding mechanisms for the individual states vary greatly. Some states supplement their plugging funds with bond or other security forfeitures, or utilize plugging fund monies to supplement a security that is insufficient to plug a well. In some states, money is made available from general appropriations to the particular oil and gas agency, such as in Arkansas where funding comes from the Commission budget. Like Arkansas, most of California's comes from its Division of Oil and Gas budget, which is supplemented by fees from long-term idle wells. A fund established in 1991 allows the Mississippi Oil and Gas Board to use excess funds from the Oil and Gas Conservation Fund (when the fund contains an amount greater than \$200,000 more than the current fiscal year's estimated budget) to plug any oil or gas well, including Class II wells, determined to be an imminent threat to the environment. Michigan's fund is from oil and gas surveillance funds, environmental response funds, when available, and bond forfeitures. Permit fees are used in Alabama, Florida, Illinois, New York, North Dakota, Pennsylvania, Texas, Virginia, and West Virginia. States that utilize a percentage of the gross production assessment or tax include Colorado, Kansas, New Mexico, Ohio, Oklahoma, Utah, and Wyoming. Kentucky funds its plugging fund solely with bond forfeitures and interest it accrues in a plugging fund. Other states utilize funds from penalty assessments, including Indiana, Missouri, New York, Pennsylvania, Tennessee, and Texas. Five states, Alaska, Arizona, Nebraska, Nevada, and South Dakota have not established any plugging fund; the fund established in Alabama in 1990 is dedicated to coalbed methane wells only.

Costs for the administration of plugging funds can be substantial and can require resources to be diverted from other important regulatory functions. While several states utilize these funds to fund the administrative costs of the plugging program, including staff positions, other states lack this authority.

Many states have adopted policies or use specific criteria to set priorities for use of their well-plugging funds. (An example is given in the draft set of guidelines from New York, included as Appendix A.) The American Petroleum Institute (API) has

developed a risk management approach for identification of wells with a high risk of contamination (See Section III.D). State prioritization schedules, as well as requirements regarding the time a well may remain idle before being placed on the list for state plugging action, are listed below. Table II shows funding amounts, sources, number of wells plugged, and monies spent or obligated.

Alabama - Wells that are potentially dangerous to the public or environment (for coalbed methane wells only).

California - 1) Hazardous wells; 2) bonded long-term idle wells; and 3) unbonded long-term idle wells. A well is permitted to remain idle for five years, unless it represents a hazard, before being placed on the list for potential action by the state.

Colorado - Wells with the potential of damage to aquifers or producing reservoirs, or that present a danger to the health, safety, and welfare of the general public.

Florida - The age of the well followed by location, depth, the formations penetrated by the well, or casing, or other materials left in the well.

Illinois - 1) Actively leaking wells or wells causing environmental damage; 2) wells that have caused environmental damage in the past and are located on leases with environmental problems associated with abandoned equipment, pits, etc.; and 3) wells that are located on leases that have not sustained past environmental damage and which do not cause any current problems or cause restrictions on current land use.

Indiana - 1) Wells posing environmental endangerment; 2) Class II versus producing wells; 3) well construction; and 4) availability of forfeited bond money.

Kansas - 1) Wells causing active pollution; 2) wells with high fluid level or subject to downward drainage, or a past or potential high environmental risk; 3) wells in areas of municipal water supplies; and, 4) wells turned in by legislative complaint. Wells are placed on a list in each district office as they are discovered, and a well actively polluting or having a high potential risk is plugged immediately. Other nonpolluting wells on the same tract or lease are plugged at the same time if the lease is totally abandoned.

Kentucky - Environmentally unsafe wells are given top priority.

Michigan - Priorities are established by a well's potential to cause either surface or underground waste, as well as public safety concerns. No time limit is established before a well is placed on the list for potential action but, by rule, a well may be considered abandoned after 60 days, as a dry hole, or one year of nonproduction. Any abandoned well may be considered for state plugging action.

Mississippi - Wells determined to be an imminent threat to the environment and which have been determined to be orphan wells.

Missouri - Priority is based on geology, hydrology, and the depth of a well in providing protection to groundwater. A well must be plugged after two years. After this period, negotiations begin on the permanent abandonment of a well.

Montana - 1) Wells considered an environmental or safety threat from surface discharge; and 2) land use.

Nebraska - 1) Danger to fresh water; 2) danger to a productive zone; and 3) surface damage. An isolated well is allowed to stand one year before being placed on the list for potential action. If it is in good condition, a well in a field having potential for enhanced recovery is maintained until final field plugging.

Nevada - All temporarily abandoned wells that have continued to remain temporarily abandoned beyond the authorized time.

New Mexico - Unless casing problems are known to have occurred, all wells are treated the same. When the new regulatory program is completely established, wells will be allowed to remain idle one year and three months before being placed on the state plugging list.

New York - 1) Threat to public safety; 2) leaking gas oil or brine; 3) proximity to water supplies; and 4) integrity problems with the wellbore. A well becomes subject to plugging after being illegally shut-in for more than one year, or temporarily abandoned for more than 90 days. Once a well is identified as hazardous, it is placed on the plugging list and will remain there until plugged and abandoned.

North Dakota - 1) The length of time on idle status; and 2) the potential hazard to the surrounding environment. After one year of inactivity, a well is subject to state plugging action.

Ohio - The priority is determined by scoring on a site-evaluation matrix, which considers environmental and socioeconomic concerns, land-use utilization considerations, and cost effectiveness of work. No specific time frame is established for placing a well on the plugging list, but wells are considered for plugging when the Division learns they are idle and a well owner cannot be found.

Oklahoma - Wells with the greatest potential for environmental damage have the highest priority for plugging. Hydrologically sensitive areas have been defined and serve as a means to establish priorities among wells. A well can remain idle for one year. Currently, most wells being plugged have been idle or abandoned for several years and no responsible party remains. It will be a number of years before the state

can get to those wells that have been idle for only one year unless an emergency exists and no financially solvent, responsible party can be identified.

Pennsylvania - The primary criteria are health, safety, and pollution concerns. A three-person committee reviews data on each well to determine its affect on public and private water supplies, public safety, surface and groundwater quality, and well integrity. The review results in a numerical score that determines the plugging priority for the well.

Texas - 1) A leaking or unsafe well; 2) a well associated with a complaint; a well located in a sensitive area; or well associated with a plugging bond where the bond has been collected or the well must be plugged prior to collection of the bond; 3) an injection or disposal well; 4) a well drilled prior to 1965; and 5) a well drilled after 1965 (stricter plugging requirements were adopted in 1965). One year of inactivity is permitted before a well is considered in violation and enforcement action is initiated.

Utah - 1) Potential for environmental degradation; 2) no responsible party for plugging; 3) no surety available for plugging; and 4) forfeited surety insufficient for plugging.

Virginia - 1) Gas and Oil Plugging and Restoration Fund - to supplement bond proceeds to pay full plugging and restoration costs when the blanket bond is insufficient; 2) Orphaned Well Fund - wells abandoned prior to July 1, 1950, that pose an imminent danger to public safety.

West Virginia - 1) Immediate threat to environment or impediment to mineral resource development — immediate plugging required; 2) not an immediate threat or impediment — should be plugged consistent with available resources; and 3) not a threat or impediment — plugging can be deferred for an indefinite period.

Wyoming - Wells with the potential to create environmental damage.

TABLE II. STATE PLUGGING FUNDS

<u>State</u>	<u>Fund Established</u>	<u>Target Amount</u>	<u>Current Amount</u>	<u>Funding</u>	<u>As of 9/30/92</u>		
					<u>No. of Wells Plugged</u>	<u>Amount Spent</u>	<u>No. of wells on waiting list</u>
Alabama	1990	\$1,000,000	\$260,000	\$150 plugging fee for all coalbed methane wells permitted This plugging fund is for coalbed methane wells only	0	0	0
Alaska		N/A					
Arizona		N/A					
Arkansas	—	—	\$150,000	From Commission budget (funds revert to general fund if not spent during fiscal year)	3	\$2,500	0
California	1977	\$500,000	\$400,000 Fund does not build up from year to year	Oil & gas production assessment fund and unbonded 5-year idle well fees	179	\$2,887,000	60
Colorado	1990	\$500,000	\$240,000	0.2 mil surcharge on market value of oil, gas, and CO ₂	7	\$135,000	25
Florida	1989	—	\$102,910	Permit fees and per well fees from trust fund (fund also funds one oil & gas inspection position)	0	0	54 (fund has not reached level in Florida to plug well and restore location and access road)
Illinois	1991	\$500,000 per year	\$750,000	Operator fees \$150/year - 1 well \$300/year - 2-5 wells \$750/year - 6-25 wells \$1,500/year - 26-100 wells \$1,500/year + \$12.50/well - over 100 wells	12	\$75,000	750
Indiana	1988	Initial appropriation \$250,000	\$500,000	Revenue from penalty assessments Permit fees, Class II well fees	0	\$75,000 in (money not allocated until FY 91-92)	20 contracts requested
Kansas	1982	Unlimited	\$500,000	Allocated from conservation fee fund which is mix of oil & gas assessments & permit fees	1,060	\$2,475,000	30

TABLE II. STATE PLUGGING FUNDS

<u>State</u>	<u>Fund Established</u>	<u>Target Amount</u>	<u>Current Amount</u>	<u>Funding</u>	<u>As of 9/30/92</u>		
					<u>No. of Wells Plugged</u>	<u>Amount Spent</u>	<u>No. of wells on waiting list</u>
Kentucky	1966	None	\$1,600,000	Forfeited bonds, with forfeited bond & cash bond account interest transferred to plugging fund (Administrative penalties not available, only enforcement action is bond forfeiture)	432	\$619,000	12,000
Louisiana	—	\$150,000 appropriated in FY 90-91 and FY 91-92; \$83,000 in FY 92-93; funds revert to general fund if not spent in fiscal year			6	\$153,706	0
Michigan	1968	None	0	Oil & Gas Surveillance & Environmental Response funds when available, and bond forfeitures	50	\$1,110,900 (Expenditures 1968-75 not available, includes \$78,750 from Environmental Response Fund)	100
Mississippi	1991	None	0	Oil & Gas Board funds in excess of budget requirements	0	0	0
Missouri	1983	\$100,000 ceiling	\$9,500	Penalty assessments on operators	25	\$22,000	6
Montana	1989	\$200,000	\$180,000	Tax on production, bond forfeitures	9	\$725,000 approved for plugging; \$514,000 add'l. requested	60
Nebraska	N/A						
Nevada	N/A						
New Mexico	1977	\$500,000 to \$1,000,000	\$900,000	.01% of value of gross production of oil & gas	25	\$100,000	0
New York	1981	\$1,500,000	\$1,000,000	Drilling permit fees plus fines and penalties collected	3	\$83,000	200 high priority
North Dakota	1983	\$50,000	\$75,000	Permit fees, forfeitures, oil and gas impact fund	0	\$50,000 on reclamation	5

TABLE II. STATE PLUGGING FUNDS

<u>State</u>	<u>Fund Established</u>	<u>Target Amount</u>	<u>Current Amount</u>	<u>Funding</u>	<u>As of 9/30/92</u>		
					<u>No. of Wells Plugged</u>	<u>Amount Spent</u>	<u>No. of wells on waiting list</u>
Ohio	1967	—	\$1,300,000	Bond forfeitures and oil and gas severance tax	1,127	\$11,200,000	700-800
Oklahoma	1990	\$5,000,000	\$200,000	.01% of value of gross production of oil & gas	292	\$889,000	600
Pennsylvania	1985	None	\$1,100,000	Fines, civil penalties, permit & registration fees	41	\$814,000	377
South Dakota	N/A						
Tennessee	1987	None	\$10,000	Penalty assessments	0	0	12
Texas	1967	\$10,000,000 per year	\$1,741,000	Fees, enforcement penalties, proceeds from bond forfeitures	5,402	\$21,858,000	1,996
Utah	1992	\$60,000	—	From oil & gas conservation tax revenue	0	0	20-25
Virginia	1990 (Gas and Oil Plugging and Restoration Fund)	\$100,000	\$154,000	Annual permit fee under Blanket Bond until \$100,000 reached, may be reassessed if fund falls below \$25,000. Fund collects interest which is applied to balance. Also, collections of debt for expenditures made from the fund are deposited in the fund.	0	0	0
	1990 (Orphaned Well Fund)	None	\$35,000	Permit fee plus interest on the fund balance	0	0	35
West Virginia	1977	None	\$243,000	\$100 fee for each well drilled plus bond forfeitures, plus civic penalties collected under the Abandoned Well Act.	26 in 1991	\$102,000 in 1991	4,000
Wyoming	1951	None	N/A	From oil & gas conservation tax revenue	0	0	Unknown

D. TEMPORARY ABANDONMENT PROCEDURES AND TECHNICAL REQUIREMENTS

Temporary abandonment procedures have been developed by states to allow wells to remain viable for production or other use in the future, while remaining mechanically sound,

All states surveyed permit temporary abandonment of production or injection wells. Typically, notification and state approval are required. Only two states, Texas and West Virginia, do not require a specific notification to the state; however, in Texas, it is assumed after nonproduction for one year that a well has become temporarily abandoned, the operator is notified by the state, and is subject to a \$100 per year permit fee. In West Virginia, a well is assumed after one year of inactivity to be abandoned unless bona fide future use is demonstrated to the state.

Conditions considered as appropriate for allowing temporary abandonment do not vary widely among states. Future utility of a well, either for production purposes, enhanced recovery, or injection, is the most common reason for temporary abandonment followed by economic conditions. Some states (Alabama, Kentucky, Nevada, and New York) specifically mentioned connections to pipelines as a condition for temporary abandonment; although, it could be assumed that, absent a specific comment in the response of other states to the survey, others also consider awaiting pipeline connection to be an appropriate condition for temporary abandonment.

Most of the states allow an initial period of temporary abandonment of six months to one year. Those states allowing a longer initial period include: Florida - up to 10 years; Illinois - five years; Indiana - two years; Kentucky - up to two years; Michigan - five years; Oklahoma - two years; and Pennsylvania - five years. With the exception of Illinois and Pennsylvania, those states with specific initial periods also allow extensions equaling the period of the initial temporary abandonment (Illinois allows annual extensions beyond the initial five-year period based upon future utility; Pennsylvania allows an unlimited number of year-to-year extensions). All states but Michigan, Missouri, New York, and West Virginia allow unlimited numbers of extensions. Missouri allows six-month extensions for up to two years, while Michigan allows extensions only by the supervisor. New York allows one-year extensions with cause, and West Virginia allows renewals if no problems exist, based on monitoring. Twenty-one of the 31 states surveyed require that injection wells receive temporary abandonment approval in the same manner as production wells.

While Alaska has no definition for temporary abandonment, the requirements for suspension are equivalent to those for permanent abandonment and include an additional requirement for a bridge plug 200-300 feet below surface capped, by 100 feet of cement.

Fourteen states have specific requirements on testing temporarily abandoned wells: California - a fluid level test is required for all five-year (long-term) idle wells, with a two-year testing interval for wells in freshwater areas and a five-year testing interval for wells in areas with no fresh water. A mechanical integrity test (MIT) is required when a fluid-level is substantially different between testing intervals or is above the base of fresh water. Colorado - a test on temporarily abandoned injection wells within two years of shut-in; Florida - a test every five years; Illinois - an MIT every five years or fluid-level survey annually; Indiana - a test every two years; Kansas - a fluid-level survey test every year, with an MIT depending on well conditions; Nebraska - a fluid-level survey or an MIT yearly; Nevada - an MIT every five years; New Mexico - an MIT up to five years; North Dakota - a test if problems are suspected; Oklahoma - a fluid-level survey annually; Pennsylvania - an MIT annually; Texas - a fluid-level survey every five years; and Virginia - for shut-in wells, operators are required to measure the shut-in pressure on production strings annually; if a well is producing through the casing, operators are required to measure the shut-in pressure on the annular space annually.

The American Petroleum Institute (API) has developed Well Abandonment and Inactive Well Practices for U.S. Exploration and Production Operations. The document provides guidance for the environmentally sound use or abandonment of wellbores drilled in oil and gas exploration and production operations. Guidance is provided for operators who must ensure environmental protection for shut-in, temporarily abandoned, or permanently abandoned wells. The shutting-in or the temporary abandonment of wells may be performed when a wellbore has future utility, such as enhanced recovery projects, and must be held in a condition where routine operations can restore a wellbore to service. Permanent abandonment is done when no future utility for a wellbore exists, and the wellbore is indefinitely sealed against fluid migration.

Several environmental concerns related to well abandonment are addressed in this document. The primary environmental concerns are protection of freshwater aquifers, as well as isolation of downhole formations productive of hydrocarbons or those used for injection. Additional issues discussed in the document are protecting surface soils and surface waters, future land use, and permanent documentation of abandoned wellbore locations and conditions.

The document provides guidance by: 1) describing the environmental concerns addressed when proper abandonment procedures are utilized; 2) describing permanent plugging and abandonment procedures; 3) establishing risk-based guidelines for monitoring shut-in and temporarily abandoned wells; and 4) summarizing major environmental legislation and associated state and federal regulations relating to exploration and production wellbore abandonment.

The Temporary Abandoned Well Policy and Procedure for the State of Kansas is included in Appendix B. The Environmental Protection Agency's Management and Monitoring Requirements for Class II Wells in Temporary Abandoned Status is included as Appendix C. Table III gives a brief synopsis of state temporary abandonment procedures and technical requirements.

TABLE III. STATE TEMPORARY ABANDONMENT PROCEDURES AND TECHNICAL REQUIREMENTS

<u>State</u>	<u>Conditions for Temporary Abandonment</u>	<u>Notification Req'd.</u>	<u>Specific Approval Req'd.</u>	<u>Initial Period</u>	<u>Extension</u>	<u>Test Req'd. on TA Producing Wells</u>	<u>Frequency</u>	<u>Injection Well TA Approval</u>
Alabama	Future utility, connection to pipeline	Yes	Yes	6 months	6 months unlimited number	No	N/A	Yes
Alaska	Production & market facilities not available, pool delineation & evaluation necessary to determine development	Yes	Yes	Indefinite		No	N/A	Not specified
Arizona	Future utility, observation and testing	Yes	Yes	Case by case		No	N/A	Yes
Arkansas	None specified	Yes	No	1 year	1 year unlimited number	No	N/A	No
California	Wells operating close to economic limit, future utility	Yes	Yes for remedial work	1 year	1 year unlimited number	Yes	Fluid level for all five-year idle wells; MIT as needed	Yes on suspension of injection project
Colorado	Operator economic conditions, future utility	Yes	Yes	6 months	6 months unlimited number	Yes on TA injection wells	Within two years of shut-in	Yes
Florida	Future utility	Yes	Yes	Up to 10 years	Up to 10 years unlimited number	Yes	Every 5 years for most wells, every 2 years for some wells	Yes
Illinois	Future utility and testing	Yes	Yes	5 years	Possible, based on future utility	Yes	MIT every 5 years or fluid level every year	Yes
Indiana	None specified	Yes	Yes	2 years	2 years unlimited number	Yes	Every 2 years	Yes
Kansas	Future utility	Yes	Yes	1 year	1 year unlimited number, proof of need more stringent after 5 years and 10 years	Yes fluid level, if high require MIT	Fluid level test annually, MIT based on well conditions	Yes

TABLE III. STATE TEMPORARY ABANDONMENT PROCEDURES AND TECHNICAL REQUIREMENTS

<u>State</u>	<u>Conditions for Temporary Abandonment</u>	<u>Notification Req'd.</u>	<u>Specific Approval Req'd.</u>	<u>Initial Period</u>	<u>Extension</u>	<u>Test Req'd. on TA Producing Wells</u>	<u>Frequency</u>	<u>Injection Well TA Approval</u>
Kentucky	Economic conditions and connection to pipeline	Yes	Yes	Up to 2 years	2 years	Operator show casing string adequately cemented	N/A	No
Louisiana	Future utility	Yes	Yes	6 months	6 months unlimited number	No	N/A	No
Michigan	Operator hardship, future utility	Yes	Yes	6 months (hardship) 5 years (utility)	Only by supervisor	No	N/A	Yes
Mississippi	Economic conditions, future utility	Yes	Yes	6 months	6 months unlimited number	No	N/A	Yes
Missouri	Future utility	Yes	Yes	6 months	6 months, up to 2 years	No	N/A	No
30 Montana	Economic conditions, future utility	Yes	No	N/A	N/A	No	N/A	No
Nebraska	Economic conditions, future utility	Yes	Yes	1 year	1 year unlimited number	Yes	Fluid level or MIT yearly	Yes
Nevada	Future utility, pipeline construction	Yes	Yes	6 months	6 months unlimited number	Yes	MIT every 5 years	Yes
New Mexico	Future utility	Yes	Yes	1 year	1 year unlimited number	Yes	MIT every 1-5 years depending on test & OCD interpretation	Yes
New York	Future utility, pipeline construction	Yes	Yes	Shut-in - 1 year TA - 90 days	1 year with cause Reasonable time period with cause	No	MIT at state option	Yes
N. Dakota	Future utility	Yes	Yes	1 year	1 year unlimited number	Yes	If problems suspected	Yes

TABLE III. STATE TEMPORARY ABANDONMENT PROCEDURES AND TECHNICAL REQUIREMENTS

<u>State</u>	<u>Conditions for Temporary Abandonment</u>	<u>Notification Req'd.</u>	<u>Specific Approval Req'd.</u>	<u>Initial Period</u>	<u>Extension</u>	<u>Test Req'd. on TA Producing Wells</u>	<u>Frequency</u>	<u>Injection Well TA Approval</u>
Ohio	Economic conditions, future utility	Yes	Yes	6 months	6 months unlimited number	No	N/A	Yes for 6 months only
Oklahoma	Economic conditions, future utility	Yes	Yes	2 years	2 years unlimited number	Yes	Fluid level annually	Yes
Pennsylvania	Economic conditions, future utility	Yes	Yes	5 years	Year-to year unlimited	Yes	MIT annually	Yes
S. Dakota	Economic conditions, future utility	Yes	Yes	6 months	6 months unlimited number	No	N/A	Yes
Tennessee	—	Yes	—	—	—	No	N/A	No
Texas	Economic conditions, future utility	No	Yes	1 year	1 year unlimited number	Yes	Fluid level every 5 years	No
Utah	Economic conditions, future utility	Yes	Yes	As necessary	As necessary	No	N/A	Yes
Virginia	Economic conditions, future utility	Yes	No	N/A	N/A	No	N/A	No
W. Virginia	Bona fide future use	No	No	1 year	May be renewed if no problems exist	Yes	Annually	No
Wyoming	Economic conditions, future utility	Yes	Yes	2 years	Up to 2 years, unlimited number	No	Every 5 years if required	Yes

E. DATA MANAGEMENT, WELL TRACKING AND INVENTORY METHODS

To identify and monitor idle wells, the vast majority of states indicated that they routinely reviewed production and injection reports for wells with zero production or checked against previous reports to identify wells that had been removed. However, this was not the case in Florida, Illinois, Indiana, Kentucky, and Ohio. In Illinois, no authority is given to collect production data; in Kentucky, the production reports are not made available to the state regulatory agency. This precludes this method as a mechanism to identify idle wells in these two states. Florida, Indiana, and Ohio do not routinely check production reports due to staffing limitations. The ability to check idle wells through production reports is limited in those states that have production reporting on a lease basis rather than an individual well basis, (i.e., Kansas, Louisiana, Missouri, and Texas).

States also use other methods for identification and monitoring purposes. In California, production and injection reports are filed on a monthly basis for all wells. An idle well list is generated through comparative analysis of the monthly reports. Through its audit process, the state is able to check the accuracy of production and injection reports submitted by the operator. An additional check in the State of Louisiana occurs when an operator fails to submit its annual regulatory fee and other required reports. Alabama maintains an active file on all wells that have been drilled. For those that are not on production and have been inactive for six months, a letter is sent to the operator inquiring as to the status and future utility of the well. In addition, many states utilize field inspections as a means of identification.

Data management capabilities vary in the various states and have an impact on the ability to identify and monitor idle wells. As demonstrated in the following summaries, data available on idle wells vary as well. Useful information for identification of idle wells and determining production capability include location, reservoir, age, construction, location of underground sources of drinking water, and other analyses. Often, these data are not available for older wells, or are not automated. The following briefly describes data collection and management methods available to the states. Additional information, not specific to idle wells, on the data management capabilities of state regulatory programs was recently compiled by the Underground Injection Practices Research Foundation (UIPRF) for the Department of Energy and can be obtained from the Ground Water Protection Council in Oklahoma City, Oklahoma.

Alabama - Geologic data includes well logs, core data, and core analyses. Engineering data includes monthly production reports, well tests, bottom hole pressure tests, PVT analyses, injection reports, completion and stimulation records. The Board has also initiated a well-file management, production management, and injection management system for all wells. This system is partially completed at this time.

Alaska - A data base is utilized for well-data collection or well history, including drilling data, well production and injection, gas disposition, gas flaring, digital well log data, reservoir parameters, and Commission compliance reports.

Arizona - The state maintains production records, well files, and a sample and core repository. Production data are entered into a computer data base (basic well data including well status).

Arkansas - Monthly forms are received by the Arkansas Oil and Gas Commission. This information is not automated.

California - The principal data base is the monthly well production and injection reporting system in which all wells, other than abandoned wells, are contained and monthly production and injection data are recorded. Printouts, microfiche, and various computer media are available. Well histories and technical well data are available on hard copy.

Colorado - The state has one data base that contains well technical data, lease production, and underground injection information.

Florida - Information requested from the operators includes well records, well completion reports, monthly well production and test reports, and monthly injection well reports. This information is not yet automated; however, the state is beginning to put the well data on a PC.

Illinois - The state maintains a multiuser networked computer data base on well location and current ownership, well construction, MIT and TA test information, and the compliance status of 55,000 production and Class II wells. An additional data base is also maintained on the overall compliance status and ongoing enforcement actions for each operator. The state does not have the authority to collect production data.

Indiana - The official records, which are on hard copy, include all the required state forms. The statistical and reporting data are stored in a computer data base.

Kansas - The Underground Injection Control inventory and plugged well data base are on the state mainframe, which is part of the Kansas water data base. Computerized listings of temporarily abandoned wells under permit are computerized on a PC network at the Oil and Gas Division, Wichita Office, and active wells on the severance tax list are on the Department of Revenue data base. Wells with approved TA status are tracked by each district office. Tracking covers status and renewal and retesting date.

Kentucky - The Geological Survey and the Department of Mines and Minerals have data bases that track well location information and completion and plugging records. The data are available to the public in printout form or on overlay maps. The Geological Survey has planned for the automation of well data and location information for public use. Production information is collected by the Department of Revenue; however, it is held as confidential.

Louisiana - Forms for well-data collection include production reports, well history and work résumé reports, well completion or recompletion reports, and the plugging and abandoning reports. This information is automated through the Production Accounting Reporting System and various well ledgers.

Michigan - A mainframe data base is utilized for permitting, production, subsurface data, compliance information, and well status changes. The district offices maintain districtwide PC data bases for average daily gas, oil, and water production, the status and type of well, and disposal wells utilized.

Mississippi - Participating in an Underground Injection Practices Research Foundation program to assist states to improve their data management capabilities and incorporate data elements necessary for risk-based decision making. Currently, information is not automated.

Missouri - Collected information includes oil and water produced, fluid injected, volume rates and pressures, and the type and amount of casing. This information is not automated.

Montana - Information includes well data from files and production reports, which are filed in a computer-based system.

Nebraska - The state utilizes a data base on a PC for its production and other well information.

Nevada - Data collected by the Nevada Bureau of Mines and Geology uses PC file software for the well-data base, and the Bureau also has the capability to generate custom-plotted maps.

New Mexico - Required reporting information is maintained on a data base. The information is retrievable from this data base using various programs. The system will be fully automated in one year when ONGUARD, the new state system, goes online.

New York - The state uses a multiuser system with a fully relational data base. The state has over 29,000 wells in the data base, out of an estimated 62,000 total wells drilled in the state. The annual production information has been computerized since

1983, and historic information is added as records become available and staffing constraints allow.

North Dakota - The various files, including lease master file production records and UIC file and injection data, are automated on a mainframe, in addition to the hardcopy files. Customized data are downloaded to a PC, as needed, and routine data access is through terminals to the mainframe.

Ohio - Since 1982, the Ohio Division of Oil and Gas has maintained a data base on each permitted well. The data base includes followup information, including ownership data, the proposed formation, completion records, plugging records, and information on brine hauling. The mainframe computer is accessed by CRT's, and individualized listings of well records can be requested by the industry and the general public.

Oklahoma - Data bases are kept regarding well allowables, production, completion, intents, well plugging, and test data. The data are entered onto a mainframe system and accessible through online use.

Pennsylvania - Data bases containing demographic, drilling compliance, production, and other information are maintained in the regional offices in Pittsburgh and Meadville. The information is housed on a mainframe computer, which is currently being updated. Terminals are located in the central office in Harrisburg and the two regional offices.

South Dakota - The state maintains geological and engineering files that include the following: well logs; sample description; core analyses; water, oil, and gas analyses; drill-stem test results; sample cuttings and cores; monthly production and injection reports; bottom hole pressure tests; annual GOR tests; MIT tests; UIC required data; wells certified to FERC for wellhead pricing; well completion and plugging reports; and sundry notices. An expanded data base that will incorporate most of this information is being established and will be networked to other interested state agencies. Hard copies are maintained for consultation and copying.

Tennessee - The state has one data base consisting of completed well information that is updated monthly. Records include location, test results, formation data, and other types of well data. The system includes approximately 10,000 records.

Texas - The reporting information is included on numerous IMS-type data bases, and is accessible through the Customer Information Control System (CICS) and Information Management System (IMS) data base.

Utah - Well data and production volumes are included in the Oil and Gas Information System. The data base resides on a mainframe at the State Capitol. Physical well files and card files are available, as well as microfiche.

Virginia - Oil and gas information is filed on a data base created and maintained by the Department. Operators may submit information on disk for conversion to the Department data base, which is an internal, systemwide data base.

West Virginia - Various data bases are utilized for West Virginia oil and gas production information. The information is reported on a monthly basis by well and operator, and the operator may file information on diskette. All wells, even nonproducing wells, must file production reports.

Wyoming - The inventory of wells and seismic drilling information is located on office PC's and on the state's mainframe. Both data bases are continually updated as the data are submitted. Monthly production, injection and disposal pressures and volumes are keypunched, used for updates to the mainframe, and downloaded for office PC use.

F. ENERGY AND ENVIRONMENTAL CONCERNS

The oil and gas producing states maintain an active interest in idle wells and strive to maintain a balance in three areas: 1) resource conservation; 2) state revenue and liability implications; and 3) environmental protection.

Producing states have enacted conservation statutes to ensure that oil and gas resources are not depleted prematurely through overproduction and depletion of the reservoir pressure. States are concerned that wells still capable of production may be prematurely abandoned. Idle wells can provide access to substantial volumes of oil and gas left in the reservoir through either conventional or enhanced recovery methods. These wells may also provide access to reservoirs with resources unrecoverable at current prices or technologies.

States are also dependent upon oil and gas production for budget revenues. Many states utilize percentages of the severance or other taxes to fund their oil and gas conservation programs, or supplement their programs with fees from permits or other functions performed by the agency. Some of the larger producing states whose budgets were more heavily dependent on oil and gas revenues have had difficulty in recovering from the price collapse of 1986 and the resultant decline in drilling activity and production.

Accordingly, the IOGCC survey asked the states for information on both the production potential of idle wells in the states, and specific information regarding any environmental damage that was proven or suspected to be caused by idle wells (and whether that proof was the result of geologic site investigations conducted by the states). The following discussion includes information from the surveys on energy and environmental concerns.

ENERGY CONCERNS

Approximately 103,000 oil wells were listed as idle and in compliance with state regulations (see Table IV). The states were asked to give an estimate of the amount of production available from the oil and gas wells that are not producing; however, not all were able to provide a production estimate. In the instance of natural gas wells, the data were not sufficiently available to estimate production. Approximately 38,000 idle oil wells were included in the surveys where states were able to provide production estimates for idle wells; the potential production was approximately 91,000 barrels of oil per day. Other states which were not able to provide production estimates had 65,000 idle oil wells. Assuming each of these wells is capable of producing approximately one to two barrels per day, which in many states was the estimated production capability, then there would be from 156,000 to 221,000 barrels per day available from those oil wells that are idle with state approval across

the United States. If this average production per well is carried to idle oil wells not in compliance, but with known operators, an additional 18,000 to 36,000 barrels per day is added, for a total of from 174,000 to 257,000 barrels per day.

These estimates assume all idle oil wells to be producers, as states do not have access to information on the future use of an idle well. It is recognized that some of these wells will be utilized for enhanced oil recovery or water disposal purposes; however, this loss of producing wells will be offset by increased production elsewhere due to the introduction of EOR processes.

Substantial volumes of remaining resources continue to be abandoned in the U.S. and the premature abandonment of currently idle wells could exacerbate this trend. Even with oil prices above \$20 per barrel, only fifty percent of the crude oil resources originally discovered in the U.S. would remain accessible by 1995¹. If prices fall to \$16 per barrel, increased abandonment would leave only thirty-five percent of the resource in these known reservoirs accessible via existing wells. By the year 2010, less than twenty-five percent of the resource in known reservoirs would be accessible for future recovery. Regaining access to a once-abandoned reservoir is an expensive undertaking that could seriously undermine the economic viability of potential enhanced oil recovery projects. Studies have shown that if wells must be redrilled, potential oil reserves may be reduced by up to one-third².

The resource potential that would be associated with currently idle wells could be significant. DOE has estimated the overall conventional and enhanced recovery oil resource potential that could be associated with these wells if oil prices remain near \$20 per barrel. Currently, idle wells could provide as much as 2.6 billion barrels of oil using conventional recovery technologies. As much as 500 million barrels of potential reserves could result from the application of enhanced recovery techniques. A simplistic methodology was utilized by DOE (as described in Appendix D) to develop upper-bound estimates of future resource recovery potential from idle wells. Given the assumptions inherent in this methodology, these estimates are optimistic.

¹U.S. Department of Energy. Bartlesville Project Office, *Abandonment Rates of the Known Domestic Oil Resource*, November, 1989.

²Brashear, J.P., Biglarbigi, K., Becker, A.B., and Ray, R.M., "Effect of Well Abandonments on EOR Potential", *Journal of Petroleum Technology*, December 1991.

Producing states have also begun innovations to attempt to balance these conservation, revenue and liability, and environmental concerns. Foremost are the temporary abandonment procedures detailed in Section III D. California and Ohio are considering programs that permit a new operator to operate a well, with lessor and state approval, without being required to assume long-term liability. In this manner, the state may be able to bring idle wells back into production and not be forced to forfeit securities (if they exist) and plug the wells.

ENVIRONMENTAL CONCERNS

The IOGCC requested specific information from the states regarding any instances of damage to groundwater from idle wells. About half of the oil and gas producing states responded that very few contamination incidents documented with geological site investigations have occurred. One state indicated that its only recent incident occurred where an injection interval intersected by an idle well had been overpressured. Also, there have been cases of surface flow of oil and saltwater from idle wells, but very few.

In most cases, an idle well is not an environmental threat. Many wells are allowed to remain idle with approval of the state regulatory authority because they are not threatening the environment or public safety.

Regardless of age or status, states have avenues through which to remediate or prevent contamination from any wells. State plugging funds are geared toward the remediation of severe problem wells up front, regardless of age or whether funds from securities or financial assurance programs are available. In addition, idle wells located adjacent to new injection wells are presently assessed under the states' UIC program through an area of review evaluation. The evaluation determines whether or not wells located within a designated area surrounding the injection well (at minimum a one-quarter mile radius) should be remediated before proceeding with a water disposal or enhanced recovery project. EPA regulations in the future will also require that area of review evaluations be conducted on existing injection wells not evaluated in the past unless a variance can be obtained by the operator. Lastly, temporary abandonment procedures utilized in many states require notification, approval, and mechanical integrity testing as another safety measure to prevent contamination from idle wells.

G. IDLE WELL STATISTICS

As a part of the survey conducted by the IOGCC to complete this study, a number of questions were asked of the states and federal government concerning the status of wells that have been drilled since the commencement of regulatory programs. The questions included the following:

- 1) Wells drilled since regulation, by type - oil, gas, dry, and service.
- 2) Wells producing or injecting, by type.
- 3) Wells plugged and abandoned, by type - oil, gas, dry, or injection.
- 4) Wells converted to Underground Injection Control (UIC) Class II, by type - EOR or disposal.
- 5) Wells not producing or injecting with state approval.
- 6) Estimate of production of idle oil and gas wells.
- 7) Wells not producing, without state approval, where the owner is known and presumably solvent, by type - oil or gas.
- 8) Wells not producing, without state approval, with the owner unknown and/or no security exists, by type - oil or gas.

In reviewing the data submitted by the states, there were significant variations in the available detail, in particular, for the number of wells drilled since establishment of regulatory programs. The states of Arkansas, California, Indiana, Kansas, New Mexico, Utah, and West Virginia were able to provide only the total number of wells drilled and were unable to develop any breakdown regarding the types of wells drilled (i.e., oil, gas, dry hole, or service); Ohio and Texas could not provide a breakdown between oil and gas wells. In addition, the figures for the States of Indiana and Nebraska were estimates only. The data for active producing or injecting wells were much more complete from the states and, with the exception of West Virginia, states were able to provide a breakdown between oil, gas, and injecting wells.

Similar problems were encountered regarding plugged and abandoned wells, in that a number of states were only able to provide a total, with no breakdown by type. Additionally, the states of New Mexico, Oklahoma, Texas, and Wyoming were only able to provide specific statistical information on certain plugged and abandoned wells after specified dates. The numbers for wells not producing or injecting with state approval were reasonably accurate; a number of states were unable to provide information for wells that were not producing and without state approval.

Given the number of estimates provided in the statistical information, as well as the inability of a number of states to provide breakdowns between different types of wells, it was not possible to determine exact numbers in the above-mentioned categories. Rather, a judgment was made that approximate overall numbers for each of these categories would serve to determine how many idle wells are in the United States.

ESTIMATES FOR UNITED STATES

Total wells drilled (oil, gas, dry, and service) since state regulatory programs were begun, and wells that were drilled prior to regulations and which have since been brought under the state programs:	3,263,000
Producing or injecting wells:	1,033,000
Plugged and abandoned wells:	1,895,000
Wells converted to UIC Class II from producing:	120,000
Wells idle with state approval:	147,000
Wells idle without state approval where the operator is known:	18,000
Wells idle without state approval where the operator is unknown or insolvent:	50,000

TABLE IV.

**State
Idle Well
Statistics**

	Commencement of Regulatory Program	Wells Drilled Since Inception of State Regulatory Program				Producing or Injecting Wells		
		Oil	Gas	Dry	Service	Oil	Gas	Injection
Alabama	1945	1,220	5,135	3,168	209	845	3,420	197 Class II
Alaska	1958	2,042	117	596(P&A)	147	1,751	130	636
Arizona	1959	57	42	819	26	21	6	19
Arkansas	1939	34,811 permits issued (1)			n/a	8,800	3,478	1,200
California	1915	141,200 wells drilled (2)				43,501	1,150	6,836
Colorado	1951	14,318	10,479	7,191	1,293	5,818	5,887	638
Florida	1946	319	0	704	44	94	0	29
Illinois	1939	42,563	403	34,572	15,537*	32,250	n/a	9,000
Indiana	1947	*Includes 1,132 Gas Storage Wells 55,000 total wells (3)				7,516	3,065	1,700
Kansas	1935	212,434 total wells drilled (4)				49,700	13,034	17,000
Kentucky	1960	38,000	11,000	35,000	5,000	22,000	11,000	5,000
Louisiana	1941	77,901	41,847	58,878	9,000 est.	28,234	15,285	4,182
Michigan	1927	14,519	4,381	20,360	3,986*	5,652	2,657	1,036
Mississippi	1948	* Including 2,477 gas storage wells 2,169 + 8,050 P&A (5)				2,169	629	763
Missouri	1966	2,400	450	650	883	1,160	116	557

	Commencement of Regulatory Program	Wells Drilled Since Inception of State Regulatory Programs				Producing or injecting wells		
		Oil	Gas	Dry	Service	Oil	Gas	Injection
Montana	1953	4,900	3,200	10,200	900	4,000	2,800	1,300 to 1,500 est.
Nebraska	1959	10,000* *est.	75* *est.	8,000* *est.	1,260	1,739	11	530
Nevada	1954	522	0	n/a	8	53	0	8
New Mexico	1935	63,924 wells (6)				26,252	19,850	3,964
New York	1963	2,291 (7)	5,727	516	648	3,796	5,482	1,210
North Dakota	1941	6,275	160	5,499	851	3,461	104	416
Ohio	1965	59,495 oil & gas (8)		6,086	633	29,890	34,580	360
Oklahoma	1915	235,334	48,356	216,000	28,000	101,438	28,084	15,000
Pennsylvania	1955	51,390 3,309 combined oil & gas wells	39,205	1,517	14,925	32,210	34,566	5,411 2,876 combined oil & gas wells
South Dakota	1939	225	100	1,300	75	154	54	74
Tennessee	1968	1,731	1,727	2,959	n/a	920	690	5
Texas	1917	1,111,701 wellbores (9)		223,982	n/a	192,627	48,000	50,000
Utah	1955	10,500 total wells (10)				2,085	950	650
Virginia	1950	1,311 oil, gas, and dry holes		n/a	1	18	570	1
West Virginia	1929	99,570 total (11)				38,121 wells (12)		500
Wyoming	1951	21,000	4,000	21,000	1,700	11,587	2,600	3,601 2,000 storage

	Plugged and Abandoned Wells				Wells converted to UIC Class II	
	Oil	Gas	Dry	Injection	EOR	Disposal
Alabama	150	225	3,168	62	80	65
Alaska	176	9	596(P&A)	22	376	5
Arizona	18	35	815	6	0	7
Arkansas	5,200	n/a	3,720	520	10	200
California	66,021 wells (13)				n/a	n/a
Colorado	2,352	829	7,191	415	571	24
Florida	126	0	704	3	17	27
Illinois	6,388	n/a	34,572	1,908	4,108*	
Indiana	44,956 wells (14)				862	125
Kansas	117,000 wells (1960-1992) (15)				n/a	n/a
Kentucky	45,600	6,000	*	1,500	500	Unknown
Louisiana	* Counted in oil & gas wells					
Louisiana	35,758	18,043	58,878	4,818 est.	900	8,200
Michigan	8,867	1,724	20,360	250 est.	500 est.	450 est.
Mississippi	8,050 total (16)		8,294	n/a		
Missouri	1,240	334	650	269	n/a	3

	Plugged and Abandoned Wells				Wells converted to UIC Class II	
	Oil	Gas	Dry	Injection	EOR	Disposal
Montana	1,500	800	11,500	200	1,100	200 to 400 est.
Nebraska	7,750	25	8,000	501	1,151	109
Nevada	n/a	n/a	469	n/a	0	8
New Mexico	11,025	2,677	3,818 From 1974	300	3,400	400
New York	5,419	1,179	1,784	2,845	986	5
North Dakota	1,888	28	5,495	294	472	379
Ohio	19,058 oil gas (17)		6,350	273	166	159
Oklahoma	32,165	6,725 (18) (1971-1991)	216,000	n/a	n/a	n/a
Pennsylvania	19,311	4,847	1,256	7,960	13,419	7
	246 combined oil & gas wells					
South Dakota	40	7	1,650	3	46	19
Tennessee	2,600 Total P&A(19)			n/a	4	1
Texas	187,205	38,480	223,982 (20)	12,757	52,894	21,041
	2,846 wells P&A prior to 1940					
Utah	5,400 wells (21)			93	450	40
Virginia	180	259	n/a	0	0	1
West Virginia	35,684 wells (22)				592	83
Wyoming	3,255 total from 1976 (23)				5,473	279

	Wells not producing with state approval to remain idle			Estimate on Production	
	Oil	Gas	Injection	Oil(b/d)	Gas(mcf/d)
Alabama	225	1,490	95	750	215,000
Alaska	15	11	1	n/a	n/a
Arizona	14	2	1	Low	n/a
Arkansas	n/a	n/a	n/a	n/a	n/a
California	29,191	850	6,451	75,000	n/a
Colorado	1,124	1,550	188	n/a	n/a
Florida	99	12	0	n/a	n/a
Illinois	594	n/a	727	n/a	n/a
Indiana	49	6	81	n/a	n/a
Kansas	3,100 wells (24)			6,000	n/a
Kentucky	500	200	Unknown	<500	20,000 est.
Louisiana	13,422	5,746	n/a	n/a	n/a
Michigan	1,010	299	n/a	<1010	<17940
Mississippi	846	46	0	n/a	n/a
Missouri	67	0	0	67-134	n/a

	Wells not producing with state approval to remain idle			Estimate on Production	
	Oil	Gas	Injection	Oil(b/d)	Gas(mcf/d)
Montana	2,800	1,300	n/a	n/a	n/a
Nebraska	503	39	229	1,000	840
Nevada	15	0	0	n/a	n/a
New Mexico	3,000	1,200	150	6,000	12,000
New York	1,068	288	47	267	7200
North Dakota	456	8	100	n/a	n/a
Ohio	30 oil & gas (25)		19	15	150
Oklahoma	1,782	n/a	500	n/a	n/a
Pennsylvania	56	213	8	n/a	n/a
	28 combined oil & gas wells				
South Dakota	13	10		260	1,750
Tennessee	n/a	n/a	9	n/a	n/a
Texas	51,336 total wells (26)			n/a	n/a
Utah	482	391	72	n/a	n/a
	(242 TA)				
Virginia	9	275	0	9-45	82,500
West Virginia	0	0	78	n/a	n/a
Wyoming	9,404	1,488	1,482	n/a	n/a

	Wells not producing, without state approval, owner known		Wells not producing, without state approval, owner unknown or insolvent	
	Oil	Gas	Oil	Gas
Alabama	0	0	7	0
Alaska	0	0	0	0
Arizona	0	0	0	0
Arkansas	n/a	n/a	n/a	n/a
California	n/a	n/a	n/a	n/a
Colorado	100	100	0	0
Florida	0	0	0	0
Illinois	3,030	n/a	750	n/a
Indiana	610 wells (27)		250 wells (28)	
Kansas	500	100	10,000 est.	2,000 est.
Kentucky	4,000	1,000	11,000	2,000
Louisiana	n/a	n/a	1,537 Wells (29)	
Michigan	Few	Few	Few	Few
Mississippi	1,848 wells (30)		28 wells (31)	
Missouri	50	n/a	17	n/a

	Wells not producing, without state approval, owner known		Wells not producing, without state approval, owner unknown or insolvent	
	Oil	Gas	Oil	Gas
Montana	n/a (Evaluation in progress)	n/a	n/a	n/a
Nebraska	0	0	1	0
Nevada	n/a	n/a	n/a	n/a
New Mexico	0	0	25	50
New York	544	634	1,055 wells(32)	
North Dakota	254	20	4	0
Ohio	500 oil & gas (33)		1,600 oil & gas (34)	
Oklahoma	n/a	n/a	175	215
Pennsylvania	n/a	n/a	215	5 2 combined oil & gas wells
South Dakota	0	0	0	0
Tennessee	n/a	n/a	n/a	n/a
Texas	n/a	n/a	n/a	n/a
Utah	0	0	25 Total	
Virginia	n/a	n/a	35 wells (35)	
West Virginia	4,516 wells (36)		18,749 wells (37)	
Wyoming	n/a	n/a	n/a	n/a

FOOTNOTES FOR TABLE IV

¹No breakdown as to type of well is available for Arkansas total wells drilled.

²No breakdown as to type of well is available for California total wells drilled.

³No breakdown as to type of well is available for Indiana total wells drilled.

⁴No breakdown as to type of well is available for Kansas total wells drilled.

⁵No breakdown as to type of well is available for Mississippi plugged and abandoned wells not included in well total.

⁶No breakdown as to type of well is available for New Mexico total wells drilled; figures for dry holes drilled prior to 1974 are not included in this total.

⁷Figures from 1966; no breakdown as to type available from 1963-1966 in New York.

⁸No breakdown as to oil or gas wells is available for Ohio total wells drilled.

⁹No breakdown as to oil, gas, or service wells is available for Texas total wells drilled; dry hole information prior to 1940 is limited.

¹⁰No breakdown as to type of well is available for Utah total wells drilled.

¹¹No breakdown as to type of well is available for West Virginia total wells drilled.

¹²No breakdown as to oil or gas wells is available for West Virginia producing wells.

¹³No breakdown as to type of well is available for California plugged and abandoned wells.

¹⁴No breakdown as to type of well is available for Indiana plugged and abandoned wells.

¹⁵No breakdown as to type of well is available for Kansas plugged and abandoned wells.

¹⁶No breakdown as to type of well is available for Mississippi plugged and abandoned oil and gas wells.

¹⁷No breakdown as to type of well is available for Ohio plugged and abandoned wells.

¹⁸Statistics on plugged and abandoned oil and gas wells in Oklahoma prior to 1971 are not available; these wells were plugged and abandoned according to regulations in place at that time.

¹⁹No breakdown as to type of well is available for Tennessee plugged and abandoned wells.

²⁰Limited statistics are available for wells plugged and abandoned in Texas prior to 1940; these wells were plugged and abandoned according to regulations in place at that time.

²¹No breakdown as to type of well is available for Utah plugged and abandoned wells.

²²No breakdown as to type of well is available for West Virginia plugged and abandoned wells.

²³Plugged and abandoned figures prior to 1976 are not available in Wyoming.

²⁴No breakdown as to type of well is available for wells not producing with state approval in Kansas.

²⁵No breakdown as to type of well is available for wells not producing with state approval in Ohio.

²⁶No breakdown as to type of well is available for wells not producing with state approval in Texas.

²⁷No breakdown as to type of well is available for wells not producing without state approval, owner known, in Indiana.

²⁸No breakdown as to type of well is available for wells not producing with state approval, owner unknown, in Indiana.

²⁹No breakdown as to type of well is available for wells not producing without state approval, owner unknown, in Louisiana.

³⁰No breakdown as to type of well is available for wells not producing without state approval, owner known, in Mississippi.

³¹No breakdown as to type of well is available for wells not producing without state approval, owner unknown, in Mississippi.

³²No breakdown as to type of well is available for wells not producing without state approval, owner unknown, in New York.

³³No breakdown as to type of well is available for wells not producing without state approval, owner known, in Ohio.

³⁴No breakdown as to type of well is available for wells not producing without state approval, owner unknown, in Ohio.

³⁵No breakdown as to type of well is available for wells not producing without state approval, owner unknown, in Virginia.

³⁶No breakdown as to type of well is available for wells not producing without state approval, owner known, in West Virginia.

³⁷No breakdown as to type of well is available for wells not producing without state approval, owner unknown, in West Virginia.

IV.

NEW LEGISLATION, OTHER PROGRAMS, AND MAPPING PROJECTS

Over the past few years, many states have passed legislation or adopted program changes to address idle wells, particularly wells that have been orphaned or that existed prior to the establishment of regulatory programs. These initiatives have included efforts to enhance the security or financial assurance requirements for all oil and gas wells, establish or enhance the administration of state plugging funds, and document the locations of wells drilled within a given state. Similarly, federal agencies such as Bureau of Land Management have undertaken various initiatives related to idle wells. Examples of these state and federal initiatives are described on the following pages; as well as guidelines issued by Province of Alberta concerning the suspension of inactive wells.

LEGISLATION

West Virginia

The following is a synopsis of legislation passed by the legislature in West Virginia, entitled "The West Virginia Abandoned Well Act".

1. Operators not otherwise required to demonstrate financial responsibility must do so by July 1, 1993. If hardship can be demonstrated, this requirement can be suspended until July 1, 1995, or the operator may be required to deposit 20 percent of the bond for each year, beginning in 1994, and continuing through 1998. Operators demonstrating financial responsibility must provide information to establish the location and identification of the well, and other information as required.
2. A \$5,000 bond for each well or a \$50,000 blanket bond is established.
3. Establishes rules to classify wells on a priority system to expend plugging funds.
 - a. Immediate threat to environment or impediment to mineral resource development - immediate plugging required.
 - b. Not immediate threat or impediment - should be plugged consistent with available resources.
 - c. Not a threat or impediment - plugging can be deferred for an indefinite period.

The agency should consider the age of the well, time of abandonment, casing remaining in the well, presence of leaks, either at surface or underground, possibility of the existence of groundwater contamination, location in an area for enhanced oil recovery potential, the potential to impede mineral development, and proximity to population.

4. Enumerates the rights of an interested person, operator, or the state to plug, replug, or reclaim abandoned wells with 20 days notice. Provides for interested person plugging the well to repair the damage or compensate the surface owner for water wells, crops, repair to personal property, or lost income or expense incurred.
5. Includes provisions for the salvage of equipment at the well site, and the recovering of bond amount and costs incidental to the plugging.
6. Provides for civil penalties for failure to plug in the amount of \$25,000, which can be deposited into the oil and gas reclamation fund.

Pennsylvania

The following is a synopsis of legislation passed in 1992 by the legislature in Pennsylvania.

1. Provides for a definition of an orphan well, to mean a well abandoned prior to the effective date of the act that has not been affected or operated by the present owner or operator, and from which the present operator, owner, or lessee has received no economic benefit, except only as a landowner or recipient of a royalty interest from the well.
2. Provides that the transfer of a permit permanently transfers the responsibility to plug the well.
3. Provides for the registration of previously unregistered wells within one year. Well owners and operators who register a well or who previously registered a well shall identify any abandoned well on the property the well owner or operator owns or leases and request approval from the Department to classify the well as an orphan well.
4. After the one-year period expires, well owners or operators who discover abandoned wells on property purchased or leased by them, or persons who are not well owners or operators who discover an abandoned well on property owned or leased by them, shall identify the well to the Department with 60

days and advise that they are seeking to have the well classified as an orphan well.

5. Gives three years for operators to bond all unbonded wells drilled prior to January 29, 1956.
6. Specifies a five-year status for inactive wells for a specific future use. After five years, the operator must plug or return a well to active status, or may be granted a year-to-year extension if the Department determines that the owner or operator has demonstrated an ability to continue to meet requirements of inactive status, and certifies that the well will be of future use within a reasonable time.
7. If a well is given orphaned status or not registered, if a prior owner or operator received economic benefit after April 18, 1979, that owner or operator is responsible for plugging. This provision does not apply to landowners or royalty interest owners.
8. Provides provisions for bonding wells where the operator cannot demonstrate sufficient financial resources, by allowing phased deposits of collateral to fully collateralize the bond. The amount is based on the number of wells the operator owns or operates.
9. Creates the Orphan Well Plugging Fund, to be funded by a \$100 surcharge for new oil wells and \$200 for new gas wells. The Department is to conduct a study on its experience in implementation and report findings to the Governor and General Assembly within five years.

NEW PROGRAMS

Florida

A legislative committee is reviewing old abandoned wells to determine if groundwater is at risk, after review of some of the older plugging procedures indicated a need for further study of the potential for groundwater contamination. The committee to select the contractor to perform the work and monitor activities consists of:

- Assistant Director, Division of Resource Management
- Geologist, Department of Environmental Regulation
- Petroleum Engineer, major industry company

- Geologist, Independent Petroleum Producers Association
- Environmentalist, environmental group

Idle wells, as well as previously plugged and abandoned wells, will be studied by the contractor and the committee.

Kansas

The Kansas Water Authority asked the Kansas Corporation Commission to establish an interdisciplinary task force to review financial responsibility options for all existing wells. The task force deliberations will not apply to abandoned wells. To be set up in 1992, the task force will be chaired by the Kansas Corporation Commission and update reports will be provided to the Kansas Water Authority. Kansas will have to seek authority to establish financial responsibility requirements.

New Mexico

The State of New Mexico has developed a program that addresses idle wells. The industry has two years to bring all wells into compliance with New Mexico rules, to mechanically test all the wells, and either put wells back on production or plug and abandon a well. Producing companies have submitted lists of which wells are going to be worked on in each quarter for the next two years to bring all idle wells into compliance. The state believes that the idle well problem will be satisfactorily addressed with this program, and that the liability for the state, where it exists, will be manageable.

Wyoming

The Wyoming Oil and Gas Conservation Commission revised its bonding regulations in May, 1992 to require additional bonding as an incentive to plug and abandon idle wells. The revisions included new definitions for "dormant well", "temporarily abandoned well", "permanently abandoned well", and "shut-in well" (included in Section IIIA). The Oil and Gas Supervisor has new authority to increase the \$25,000 blanket bond for dormant wells at the rate of \$2.00 per foot for each dormant well; this additional bonding may be required when the operator's total footage of dormant wells exceeds 12,500 feet. When wells are removed from dormant status, the additional bonding amounts will be reduced accordingly.

For those wells where additional bonding is required, the supervisor may allow the posting of at least 5.55 percent of the additional bond each month for eighteen months or until the total amount has been posted. In lieu of additional bonding, the operator may file a detailed plan that includes a schedule to permanently plug and abandon those wells considered dormant, or to take action to remove those wells from dormant status; the schedule will not exceed two years.

The supervisor must be advised at least thirty days prior, before any transfers of wells take place. This will permit the supervisor to evaluate the status and number of wells involved in the transfer and determine the need for additional bonding. The new owner will be notified no later than fifteen days before closing of any additional bond required, and the previous owner shall remain liable for plugging until the new owner provides the additional bonding requested.

BLM Policies for Shut-in/Temporarily Abandoned Wells

Since the decline of oil prices in 1986, the Bureau of Land Management (BLM) has implemented a policy intended to prevent the premature abandonment of marginal or stripper wells and associated leases due to a poor economic climate. This policy grants a suspension of producing obligations of these marginal leases for up to one year. The lease would remain in effect, even though no production was taking place, with a royalty payment of \$1 per acre per year mandatory under the terms of the suspension.

The goal of this suspension policy is to allow leases that might otherwise be forced to be abandoned to remain available until economic conditions improve. By allowing economically marginal wells to suspend production, the likelihood of the abandonment of a well which still contains hydrocarbons decreases. In each successive year since 1986, based on a BLM reevaluation of this policy and existing oil prices, the granting of suspensions has been renewed. In 1986, 277 leases with 637 total wells benefited from this suspension policy; in 1989, the number was 415 leases with 798 total wells; and, at the end of 1991, the number was 367 leases with 734 wells.

BLM requires that the party applying for the suspension must certify that in the absence of an approved suspension there may be a premature abandonment of the wells, with a resulting loss of recoverable resources.

On September 10, 1992, the final BLM rule amending 43 CFR 3103.4-1 relating to a royalty rate reduction for stripper oil properties was effective. The revised rule was established to encourage the operators of federal stripper oil properties to place marginal or uneconomical shut-in wells back in production and to provide the economic incentive to increase production by reworking such wells and/or by implementing enhanced recovery projects.

Under Onshore Oil and Gas No. 8, the BLM has proposed a rule (56 FR 20586; May 6, 1991) that would supplement the requirements found in 43 CFR part 3160 relating to onshore oil and gas operations. Specifically, Order No. 8 would require that gas and oil operators comply with minimum standards of performance when conducting well completions, workovers, or temporary well abandonments on any federal and Indian lands (except Osage). Each of these operations is defined as follows:

- **Well Completion** - Work conducted to establish the producibility or serviceability of a well after the production-casing has been set and cemented.
- **Workover** - Work performed on a well in order to increase or restore production.
- **Temporary Well Abandonment** - Work conducted to secure a well that is physically or mechanically incapable of producing oil and/or gas of sufficient value to exceed direct operating costs but may have value as a service completion for enhanced recovery or water disposal. Production can be halted temporarily without the well being plugged with cement.

Order No. 8 details the requirements that would be mandated to assure that these operations do not result in undue damage to surface or subsurface resources. For each operation, the following categories or requirements are detailed: (1) approval and reporting, (2) informational, and (3) operational. For each operational requirement, the type of violation (minor or major), necessary corrective action, and normal abatement period are listed. General variances to all specific requirements may be granted on a case-by-case or field basis.

BLM, in developing this proposed rule, utilized standards prepared by the Oklahoma Corporation Commission, the Texas Railroad Commission, and the New Mexico Environmental Improvement Division. Public meetings were also held in Roswell, New Mexico (July 17, 1990), Casper, Wyoming (July 19, 1990), and Bakersfield, California (July 24, 1990) so that comments could be solicited (55 FR 21660; May 25, 1990).

BLM accepted public comments on the proposed rule up to July 5, 1991. These comments have been evaluated, but currently there is no schedule for the promulgation of a final rule, nor has a decision been made as to the temporary well abandonment standards that will be required.

The requirements for temporary well abandonment under proposed Order No. 8 include:

- No well shall be temporarily abandoned for more than 30 days without prior approval from an authorized officer (BLM employee) or representative. A 12-month delay in the permanent abandonment of the well may be authorized. Additional delays may also be authorized if justified by the operator.
- The following information must be provided as part of a Sundry Notice: (1) rationale for temporarily abandoning the well rather than permanently abandoning or producing the well, (2) time period that the well will be temporarily abandoned, (3) plans for down-hole integrity testing of the well, (4) plans for isolating the perforations from the surface and, (e) plans for securing the wellhead at the surface.
- One of two possible casing integrity tests shall be required for all temporarily abandoned wells at least once every three years. The two test methods are: (1) casing tested to ensure that it will hold a minimum of 70 percent of the internal yield of the casing being tested minus the hydrostatic pressure of the test fluid at the deepest point for a minimum of 30 minutes, with less than 10 percent decline, or (2) casing filled with an inert fluid with a pressure test conducted to 500 pounds per square inch gauge with no pressure drop for 30 minutes.
- A retrievable or a permanent-type bridge plug or a cement plug at least 50 feet in length shall be set in the casing within 100 feet above the producing interval.
- The wellhead shall be secured.

Alberta Suspension Guidelines

The Alberta Energy Resources Conservation Board (ERCB), concerned that the proliferation of inactive wells could have adverse impacts on environmental safety and oil and gas conservation efforts, issued Interim Directives ID90-4 (1990) and ID90-5 (1991) concerning the suspension of inactive wells. Inactive wells are defined as those wells that have never been completed or operated (capped or standing) and those where no production or injection has taken place in the previous 12-month period, including those wells where operations are suspended for economic reasons or mechanical problems. The purpose of these guidelines is to ensure the long-term integrity of suspended/inactive wells with respect to public safety and environmental

protection matters, and the minimization of the ultimate abandonment costs of these wells.

Of the more than 150,000 wells drilled in Alberta as of January 1, 1992, about 27,500 were listed as inactive; that number grew by 34 percent from 1985 to 1990. It is anticipated that the number of inactive wells will drop to a manageable level once operators comply with the new guidelines.

The guidelines contain suspension practices for the following types of wells:

- Class A - Wells not completed
- Class B - Sweet and Low H₂S surface killable gas wells
- Class C - Wells that will not flow
- Class D - Flowing, sour, and other wells
- Class E - Critical sour wells

These guidelines include requirements that address well type, downhole equipment, wellbore environment/fluids, wellhead, wellhead and casing integrity tests, inspection frequency, and security.

The ERCB has established the following compliance deadlines:

1. Wells suspended prior to January 1, 1977 and all Class E wells must comply by January 1, 1994.
2. All wells suspended between January 1, 1977 and January 1, 1982 must comply by January 1, 1996.
3. All wells suspended after January 1, 1982 and prior to September 20, 1990 must comply by January 1, 1999.
4. All Class A, B, C, and D wells suspended after September 20, 1990 must comply within 12 months of shut-in date and Class E wells within six months of shut-in date.
5. All suspended wells included in a well license transfer must comply within six months of approval of well license transfer.
6. Existing suspended wells subject to workover operations and subsequently resuspended must be brought up to standard during workover operations if the

well is not to be placed back on production or injection within 12 months of shut-in for Class A, B, C, and D wells or within six months for Class E wells.

The suspended-well guidelines constitute only one facet of a comprehensive program to deal with the financial implications of orphan wells. The ERCB has been working with representatives of the three industry associations in the Province and other affected government departments to develop a comprehensive program to deal with the abandonment of orphan wells. The centerpiece of this program was the establishment of an "Orphan Well Abandonment Fund" which will see industry cover 100 percent of the actual abandonment costs associated with orphan wells. The ERCB will be responsible for coordinating the program and prioritizing the wells to be abandoned in a given year. The abandonment expenditures will be recovered through an annual levy against suspended/inactive wells. The basis upon which the levy is calculated (total nonabandoned well population versus some segment thereof such as suspended/inactive wells) may change over time; however, the principle that industry pays the total operational costs of orphan well abandonments will remain the same.

The ERCB has also established a program respecting the evaluation of the financial and technical capabilities of all new companies that enter the oil and gas business or companies that substantially increase the number of wells owned. This evaluation pertains to new well licenses or to existing wells being transferred from another company. The ERCB has the authority to refuse the application for a new well license or the transfer of an existing well license or to require the establishment of an abandonment trust fund, deposit, line of credit, or any other appropriate form of security as part of the approval process.

A number of legislative changes are also being finalized that will strengthen the ERCB's authority to deal with all matters related to orphan wells. The existing legislation allows the ERCB to take possession of wells and to sell production or equipment from a specific well to recover abandonment costs for that well; however, industry appears ready to allow expansion of these provisions to allow the ERCB to obtain a lien against all of the assets owned by a particular company.

The basic premise in dealing with orphan well abandonment expenses is that all working interest owners in a well will only be responsible for their respective share of the abandonment costs. The share of expenses attributable to a defunct company will be borne by the orphan well fund.

MAPPING PROJECTS

These mapping projects demonstrate the efforts of two states to enhance their data management capabilities of idle wells.

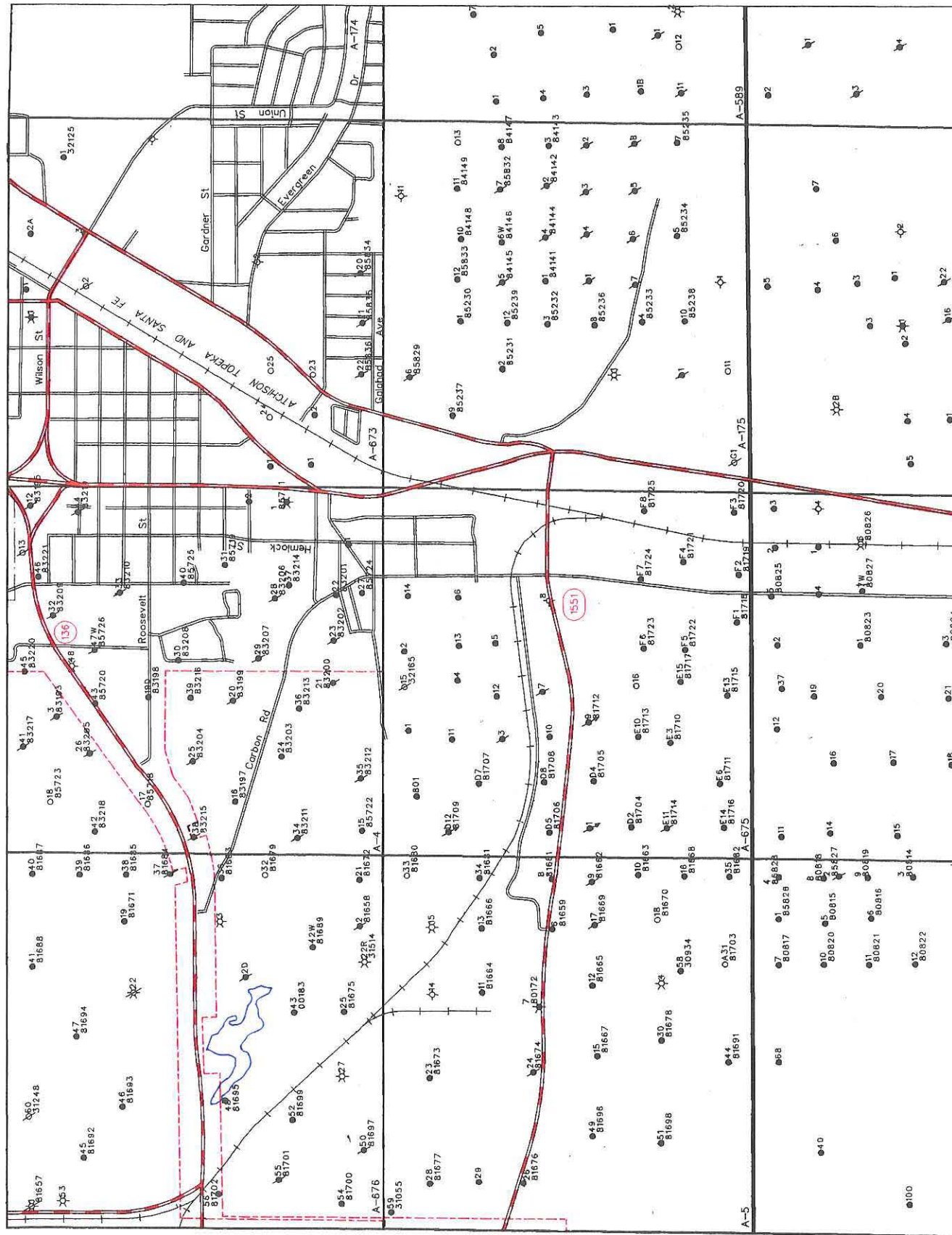
The State of Texas has an ongoing project for computerized well location maps, which include all current and historical wells. The original maps have become worn and overcrowded. Therefore, in 1984 the Commission began building a computerized well location mapping system, which is easier to maintain, more legible, and more up-to-date. The computerized maps correspond geographically to a single U.S. Geological Survey 7.5-minute quadrangle. The well symbols on the map represent a single wellbore, and various symbols are used to indicate the status of the wellbore. An attempt is made to reflect the current well status and identify the API number for each wellbore. One hundred nine of the 253 counties in Texas have been completed and all wells digitized, as well as all offshore wells, which represents 43 percent of all inland wells, and with those offshore, approximately 50 percent of the wells in Texas. The project is to be completed by late 1994. A copy of a section of one Railroad Commission map with accompanying legend is included on page 73.

The State of West Virginia has also instituted a well mapping project, which includes wells of three categories:

- 1) Post-1929 wells assigned regular series API numbers; Abandoned Series Well numbers; or Fractured Series Well numbers;
- 2) Pre-1929 wells assigned numbers or taken from West Virginia Geological Survey Deep Well Survey Publications; and
- 3) Pre-1929 wells with only a location available.

The state has an estimated 80 percent of the counties completed and anticipates that this project will be completed by the end of 1992. A copy of a portion of West Virginia's mapping project follows on page 75.

TEXAS MAPPING PROJECT



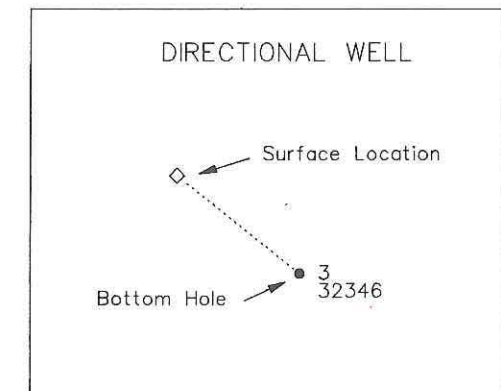
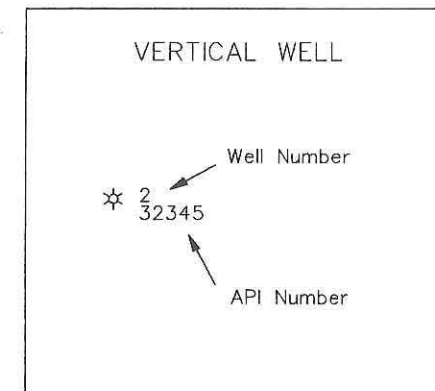
From Borger 7.5 minute quadrangle - 1" = 2,000'

RAILROAD COMMISSION OF TEXAS WELL LOCATION DATABASE MAP LEGEND

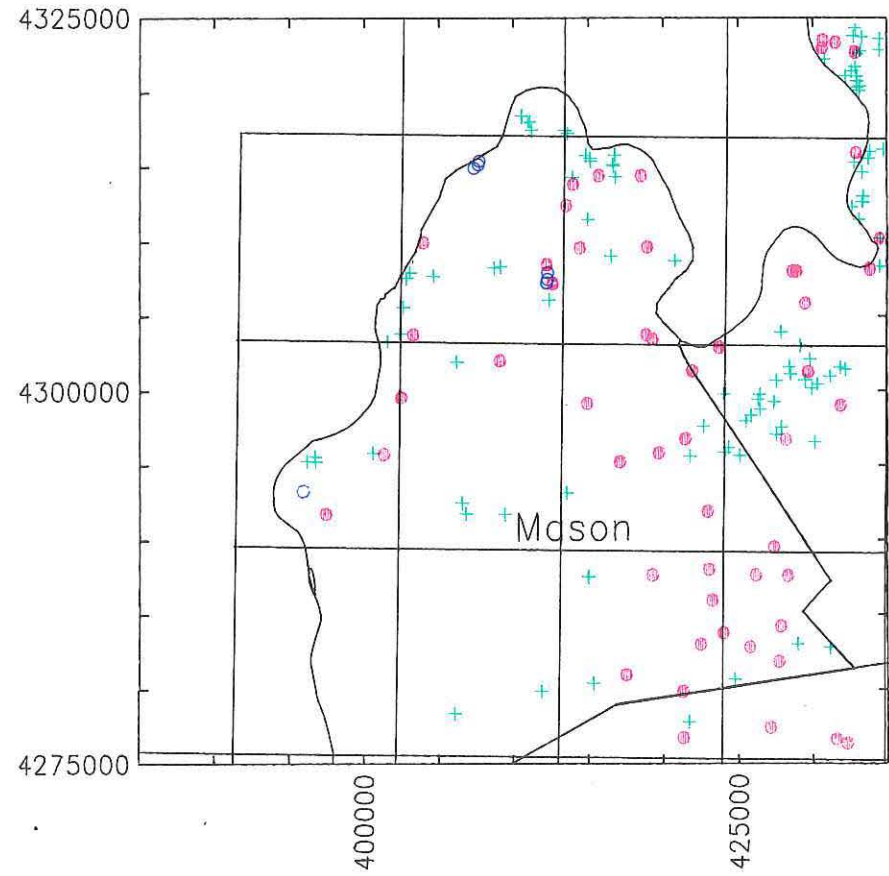
- | | | | | | |
|--|---------------|--|--------------------|--|-------------------|
| | State Highway | | Interstate Highway | | Farm / Ranch Road |
| | State Highway | | U.S. Highway | | Park Road |

WELL SYMBOLS

- | | | | |
|--|--------------------------------------|--|-----------------------------------|
| | Proposed Location | | Geothermal |
| | Cancelled Location | | Brine Mining Injection |
| | Dry Hole | | Water Supply |
| | Oil | | Water Supply from Oil |
| | Gas | | Water Supply from Gas |
| | Oil / Gas | | Water Supply from Oil / Gas |
| | Plugged Oil | | Observation |
| | Plugged Gas | | Observation from Oil |
| | Plugged Oil / Gas | | Observation from Gas |
| | Injection or Disposal | | Observation from Oil / Gas |
| | Storage | | Shut-In Oil |
| | Oil Storage | | Shut-In Gas |
| | Gas Storage | | Core Test (one or more holes) |
| | Radioactive | | Sulfur Test (one or more holes) |
| | Injection or Disposal from Oil | | Horizontal Drainhole |
| | Injection or Disposal from Gas | | Directional Well Surface Location |
| | Injection or Disposal from Oil / Gas | | Sidetrack Well Surface Location |



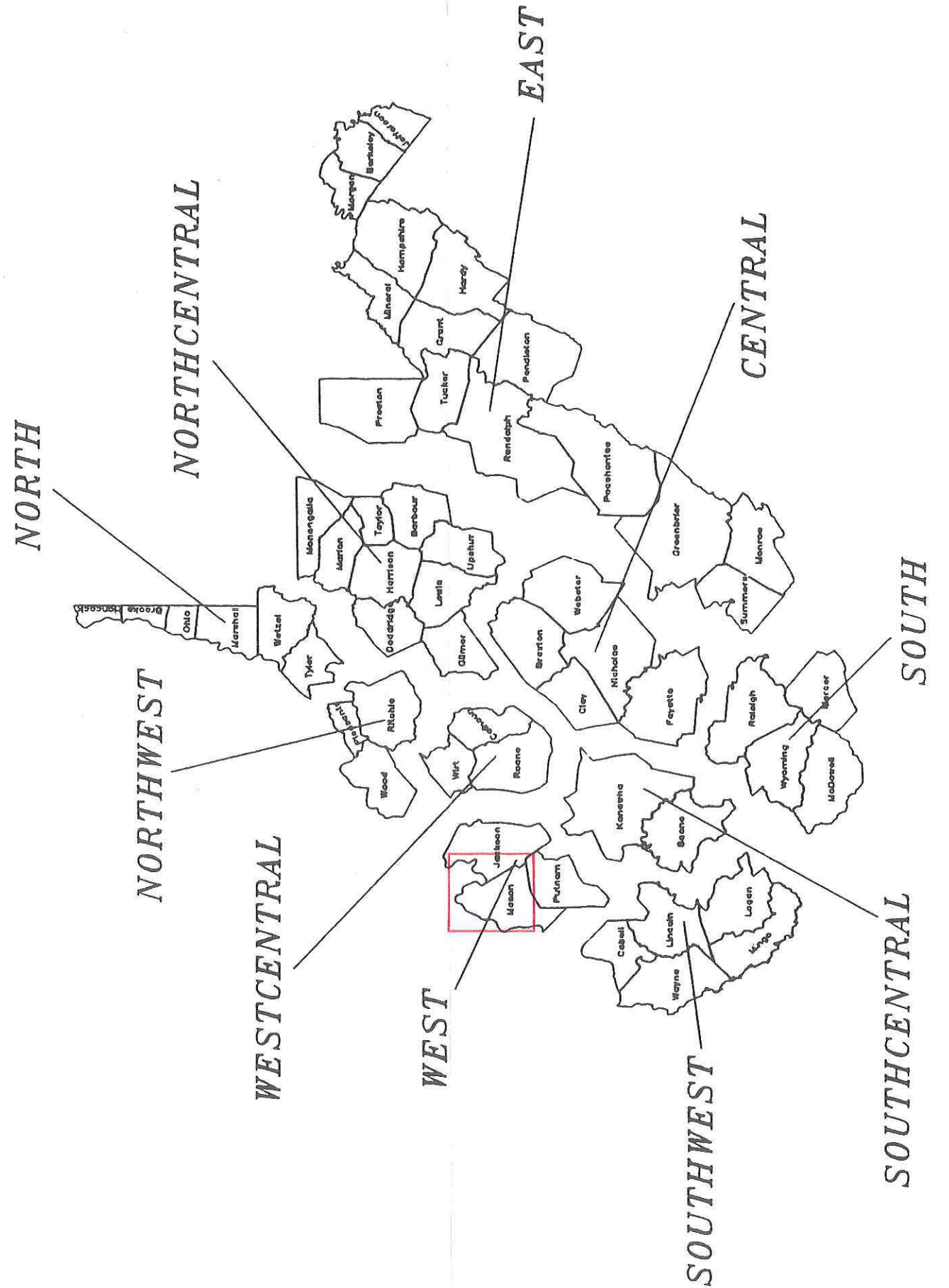
WEST VIRGINIA MAPPING PROJECT



LEGEND

- + Post-1929 wells assigned regular-series API numbers or Abandoned-series wells (i.e. 30001=1A) or Fractured-series wells (i.e. 50001=1F)
- Pre-1929 wells assigned 70000-series numbers or wells taken from WVGES Deep Well Summary publications assigned 80000-series numbers, both arbitrarily assigned for internal use only by the WVGES
- Pre-1929 wells with only a location available, arbitrary permit numbers assigned for internal use only by the WVGES

Scale - 1:500,000



V.

RECOMMENDATIONS FOR STATE PROGRAMS

Through the efforts of this study, the IOGCC believes that the states have demonstrated their active interest in the maintenance of idle wells, particularly in regard to the conservation of the nation's oil and gas resources, potential revenue and liability implications for state regulatory programs, and protection of the environment. States generally have adequate statutory authorities and programs to address idle wells. However, there may be areas for improvement in these state idle well programs that can be implemented using the experience gained by other states. The following recommendations represent the areas in which states can improve programs.

1) Assurance of Financial Responsibility

All states have the authority to require well operators to provide the state with some form of assurance of financial responsibility, or license operators in lieu of security requirements. This assurance is based upon appropriate costs of plugging, depth, and location; recent upgrades have been made in these requirements. States should continually evaluate the mechanisms most appropriate for their needs. These mechanisms include bonds, certificates of deposit, cash, certification of operators, and fees in lieu of bond. The states should implement changes when necessary to provide assurance for plugging and determine whether more realistic amounts should be considered to the extent feasible. The states should also consider the adoption or expansion of programs similar to those adopted in Pennsylvania and West Virginia (see Section IV) to bring nonsecured wells, which may be exempt under some state statutes, under some type of financial responsibility and allow for phased-in compliance under certain circumstances.

2) Future Use and Testing Requirements

Given the current status of the domestic oil and gas industry, the states should consider establishing procedures whereby an operator demonstrates a bona fide future use of an oil or gas well when granting approval to allow a well to remain idle. The first approval should have a set time limit and specify requirements for extensions from that limit. A mechanical integrity test or similar requirement to ensure the stability of the well should be required during the period of idle status. Individual states may wish to utilize risk assessment procedures similar to those developed by the American Petroleum Institute (see Section III D) to establish the necessary testing requirements.

3) Plugging Funds

The majority of states have developed a means for the state to plug and abandon orphan and preregulatory wells when necessary. States should periodically review their funding mechanisms to ensure they remain adequate. A variety of funding mechanisms should be considered, including yearly fees on a per-well basis, earmarking of other fees for services within the agency to the plugging fund, or a specific yearly appropriation from the legislature. Some states also utilize a percentage of the gross production tax for the fund; however, as oil and gas production continues to decline, this source of revenue will also decline. The states should also consider seeking authority, if it is not available, to use these monies to fund the administrative costs of the plugging fund, including staff positions.

4) Priority List for Plugging

States should establish a priority list for plugging and abandoning orphan and preregulatory wells under the state plugging fund. For example, an outline has been developed in a statute in West Virginia (see Section IV), and states may further define any such statutory list in their regulations. One option might be the development of a point system (see draft of New York Guidelines in Section VI), based upon condition and location of a well. For well condition, a range could be established, giving the lowest ranking to wells not causing contamination and a higher ranking where, if the well is not plugged properly, there is flow to surface or groundwater, and there is danger of contamination. Similarly, a location can be ranked as to whether a well is located in an unpopulated area, or it is in proximity to farmland, housing, or public buildings. Also, consideration should be given to the presence or absence of a supply aquifer or a public or private water supply well. States should be in a position to explain the priority system to interested parties and modify rankings as needed to accommodate special circumstances.

5) Streamlined Procurement

The states should have streamlined procurement procedures in the bid process for plugging and abandoning wells using either security forfeiture or plugging funds. A state should also have mechanisms to ensure it can respond to an emergency situation in a timely manner.

6) Enforcement Authority

The states should have adequate enforcement mechanisms to ensure compliance with state financial responsibility and temporary abandonment requirements, including sufficient funding and staffing. The mechanisms may

include administrative remedies such as permit suspension or revocation or the ability to levy civil penalties for failure to comply with administrative orders. If adequate funding is unavailable for either agency operations or the plugging fund, states should consider seeking authority to deposit civil penalty monies into agency operating or plugging incurred by the state.

7) Liens and/or Equipment Salvage

Several states have authority to place a property lien or salvage equipment at wellsites that have been orphaned by the operator. States should consider seeking authority to enable a state or contractor to salvage equipment on the wellsite once the plugging and abandonment procedure has been completed to offset costs of plugging with state funds.

8) Data Management

States should ensure they have an adequate data management system for tracking and identifying idle wells and determining that all state requirements have been met.

9) Innovative Approaches to Conserve Oil and Gas Resources

States should examine and undertake innovative approaches, where practical, to ensure the proper environmental safety of the wellbore of an orphan well so that it will remain available for a bona fide future use. A new approach is under consideration in California and Ohio that would allow a new operator to operate an orphan well, without assuming long-term liability, if approved by both the lessor and the state.

10) Evolving Programs and New Authorities

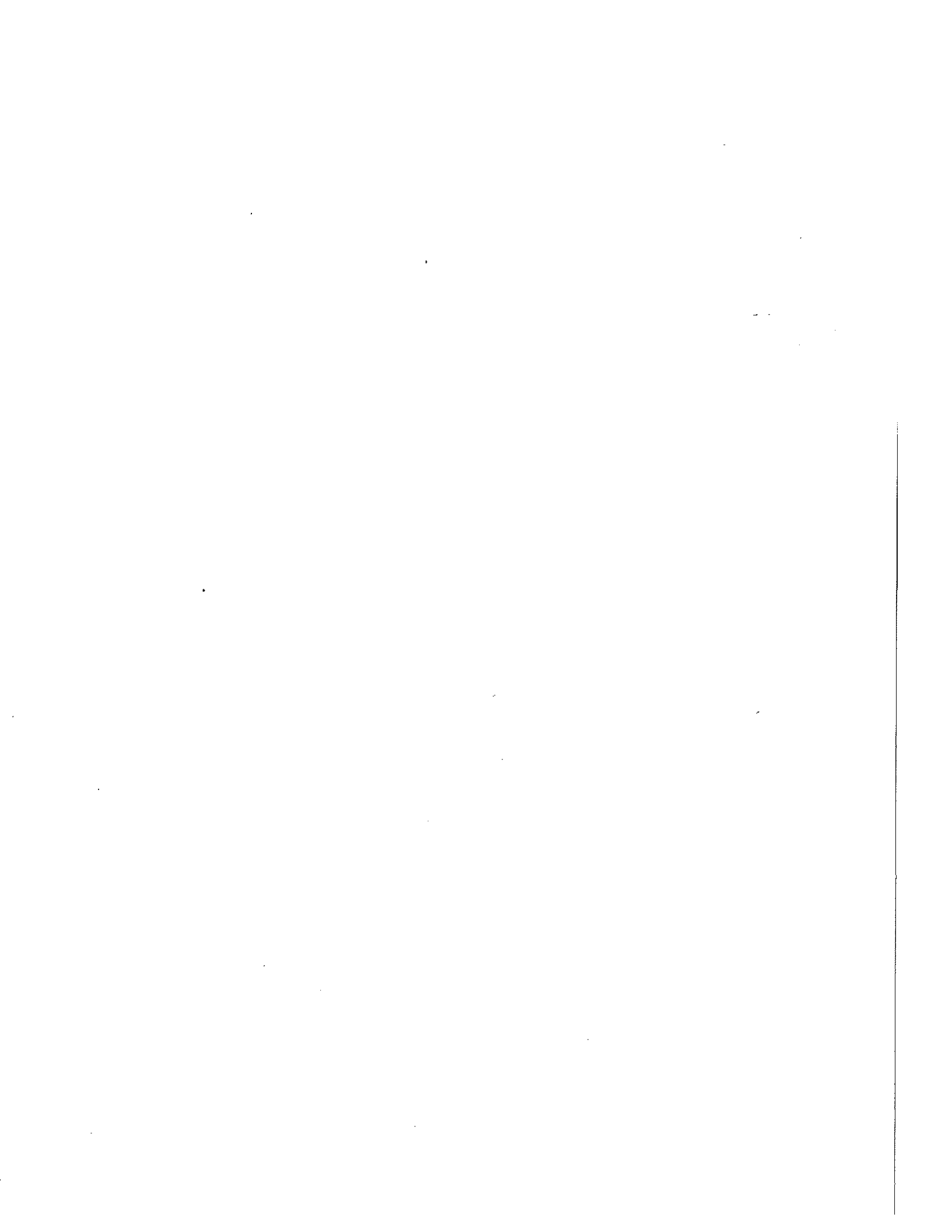
The states should continue to keep up with new technologies, innovative approaches, and evolving trends in both government and industry, and make program modifications or seek new authorities when necessary.

11) Future Study

The IOGCC recommends the continued involvement of the states in future efforts with the Department of Energy to further study idle oil and gas wells. Recommended areas for future work include developing model criteria that could be used by states to set priorities for the use of state plugging funds; tracking the progress of recent state initiatives on orphaned wells, both for resource potential as well as considerations for plugging and abandonment; and

assisting states to improve their capabilities to manage data on idle wells for resource conservation, environmental protection, and compliance evaluation.

VI.
APPENDICES



APPENDIX A

STATE OF NEW YORK DRAFT GUIDELINES FOR THE ESTABLISHMENT OF AN ABANDONED WELL PLUGGING PROGRAM (DEVELOPED IN 1987)

INTRODUCTION

Thousands of abandoned or improperly plugged oil, gas and solution mining wells exist in New York State. The Oil, Gas, and Solution Mining Legislation requires that abandoned wells be properly plugged. Sections 23-0305.8e and 9e allow agency representatives to "Enter, take temporary possession of, plug or replug any abandoned well as provided by the rules and regulations, whenever any owner or operator neglects or refuses to comply with such rules and regulations." 6NYCRR Part 555 gives details for the plugging and abandonment requirements. These regulations were last amended in 1972 and, therefore, do not reflect recently developed standards and requirements.

It is the purpose of this study to (1) define the procedures to be used in identifying wells to be plugged and (2) establish the criteria to be used in a generic plugging contract. This generic contract could then serve as a basis for agreement between the Department and Subcontractors who are awarded the bid to plug and abandon a well.

This study is presented in the format of an expanded outline. Broad topics include the identification of abandoned wells, the development of a plugging contract, and recommendations for further work on the project. Details on each of the topics are provided in the outline form.

- I. Problem Well Identification
 - A. Location of Abandoned Wells
 1. Definition of Abandoned Wells
 - a. The well has been shut-in for more than one year or temporarily abandoned for more than 90 days, without the owner having submitted an application for such status to the Department.
 - b. An application for legal shut-in or temporary abandonment status has been rejected by the

Department and the owner has not permanently abandoned or returned well to production.

- c. The period of lawful shut-in or temporary abandonment has expired without the owner applying for renewal of such lawful status, or without the owner permanently abandoning or returning the well to production.
- d. The well has been plugged and abandoned, but because of improper plugging or other cause, the well poses a risk to public health, safety or the environment.
- e. The well poses an imminent risk to public health, safety, or the environment and the owner has failed or refused to correct the problem.
- f. The Department has no records on the status or condition of the well.

2. Identification of abandoned wells requires a series of steps.

a. Recent Wells

For wells that are on the State records and for which a certain amount of information is known (i.e. production records, temporary abandonment requests, completion reports), a cross check of this data will begin to identify wells that have been illegally abandoned. Once an identification is made, further confirmation can be accomplished by a site inspection.

b. Old Wells

In the case of old wells or old fields of which very little is known, a well identification program will likely start in areas where obvious problems exist or complaints have been registered. The search for actual well sites would begin with a review of the following records:

- (1) Old well data base
- (2) Old field maps
- (3) Historical literature
- (4) Available corporate records

After an initial review has been made, locations must be cross checked and a field verification conducted. Additional old, abandoned wells may even be discovered during the field investigations.

B. Well Site Inspection

1. Develop an inspection form which would cover the following:
 - a. Condition of well site (from surface observation)
 - b. Condition of wellbore (from surface observation)
 - c. Conditions a & b (above) from old records, or landowner interviews, etc.
 - d. Environmental assessment (location of well) Identification of nearby circumstances i.e., forest, active agricultural, aquifers, public areas, etc. (Table 1).
 - e. Assignment of priority rating

C. Establishment of Priority Rating

It is the goal of the Department to give immediate priority to plugging or replugging those wells which pose an existing or imminent risk to public health, safety or the environment.

1. After a review of existing records and field observation, a priority ranking can be determined. Environmental and safety considerations may be defined as follows:
 - a. Condition of the Well

Present condition of the well itself is based upon the actual field observation of mechanical integrity, leakage, etc. (See Table 1)

b. Location of the Well

The actual location of the well as it is related to nearby sensitive areas, residences, water supplies and the effect of the well on these areas will aid in the determination of a priority list. (See Table 2)

c. Complaints

Investigation of complaints that may be related to abandoned wells must be carried out thoroughly. Information gathered should include any history or recurring problems, water well data, tests, interviews and a field inspection of the well site or search for the source of the problem. Should the complaint be based upon problems actually caused by an abandoned well, an additional priority value could be assigned.

2. Assignment of priority rating would then be based upon the point system shown in Tables 1 and 2. This table could be the basis for a more expanded list of possible wellbore and surface conditions. In this way, prioritization would be more concise with the definition of as many variables as possible.

TABLE 1
Well Condition

<u>Suggested Points</u>	<u>Well Status</u>
2	- plugging condition unknown, no apparent surface or underground problems
4	- well known to be improperly plugged (e.g., open casing or wooden plug) but no apparent surface or underground problems
6	- caving around casing or wellbore, or discharge of brine or water from well
8 to 10*	- discharge of oil and/or gas from casing*
10 to 14*	- discharge of oil, gas and/or brine from earth to casing annulus*
14	- discharge of H ₂ S to atmosphere

*depending on volume of discharge

TABLE 2

Well Location

<u>Suggested Points</u>	<u>Well Status</u>
1	- in forest, woodland or abandoned field
2	- on active agricultural land
3	- in close proximity to residential or urban land
4	- within 150 feet of surface water or wetland
5	- within 150 feet of a residence or private water supply well
6	- within 200 feet of any public building or area which may be used as a place of resort, assembly, education, entertainment lodging, trade manufacture, repair, storage, traffic or occupancy by the public
7	- in a primary water supply aquifer, or within 660 feet of public water supply wells, or within 200 feet of surface water directly providing public surface water supplies

D. Identification of Responsible Owners

1. Responsible Party:

Legal opinion from central office states that "present mineral owner" is responsible for plugging of any abandoned well.

2. A search procedure must be established in cases where a current operator is not found in Department records.

a. Title search of lease records to determine last lessee (will necessitate Department or outside legal help).

b. Search of State business records for ownership or corporate transfer/sales.

c. Interviews with landowner, town clerk, etc.

d. Old Department & museum records.

e. The above search procedures could involve time consuming and costly efforts in title search, particularly on old, abandoned wells involving properties and corporations that have changed hands many times.

3. Once a responsible mineral owner is found, notification procedures should be followed.

a. Contact the responsible party and apprise them of the situation.

b. Inform landowner (if separate of the situation).

c. Attempt to get cooperation of (owner) organization to plug or replug, or to bear costs involved.

(1) Legal precedence exists whereby NY State may charge back plugging costs (Duscherer Case).

(2) Citations may be issued, fines levied, or other legal remedies pursued.

4. For cases where a responsible party is not identified, proceed to the section on funding sources.

E. Determination of Funding Sources

Once priorities are established, the source of funding for the plugging of wells must be established. Four possible sources of funding have been identified:

1. If the well is covered by the State financial security requirements, the bond or deposit can be called in by the Department and the funds used towards the cost of plugging.
2. The individual or company holding the mineral rights or the company that originally drilled the well can be pursued to recoup the plugging costs.
3. The Oil and Gas Fund established by the Legislature could be used for plugging wells or repairing damage from drilling where identification of a responsible party cannot be made. Revenues for this fund are collected from permit fees and enforcement actions.
4. In the past, federal sources of funding have been available for specific projects. One example is assistance provided by the Appalachian Regional Commission for plugging wells in the Allegany State Forest in 1963. While it is presently unknown whether any such sources are available, all potential avenues should be investigated.

II. Development of Plugging Contract

Once wells have been selected on the basis of the priority system, an appropriate contract must be drawn up for requesting bids for the actual work. Five contract types have been selected for this discussion.

A. Turnkey Contract

Under this type of contract, the entire plugging job or project would be let out for bid at a fixed cost. The Department would issue a bid request detailing the location and known condition of the well. Included in this bid request would be road requirements, existing casing, tubing and other appurtenances and wellbore

conditions. Plugging procedures according to Department policy would also be fully described. Contractor's bids would be for all of the costs of equipment, labor and material involved in the project.

This contract type would be the most effective for the Department in that any cost overruns due to mechanical or physical problems with the well would be borne by the contractor.

B. Day Rate Contract

This method is similar to turnkey contracts since the contractor is responsible for all of the work and hires all of the services and subcontractors. Day rate contracts also require certain services and/or specifications, but are open-ended in specifying a time frame for completion of the project. Per-diem allotments are included in the bid with the required materials and services. This contract type is more accommodating to contractors when bidding on wells with unknown downhole conditions. However, because estimating the costs and time required to plug such a well would be extremely difficult, it may not appeal to the Department. This contract type would require a fair amount of direct Department supervision.

C. Hourly Rate Contract

This type of contract requires the greatest amount of Department supervision. Bids would need to be taken for each subcomponent of the plugging operation. The Department would act as the general contractor under this arrangement. A contract of this type is usually very cost effective, but it would demand the greatest investment of time by the Department in direct supervision. In using this kind of arrangement, it is likely that fewer wells would be plugged unless additional personnel were hired to meet the requirements that an extensive plugging program would demand.

D. Cost-Plus Contract

The basic premise for a cost-plus contract is similar to the hourly, except that a contractor is used to supervise the operations. Expenses are paid by the contractor who then charges back to the third party the actual costs plus a percentage of the cost to cover overhead and reasonable profit. This is probably the least desirable type of contract because the cost-plus arrangement

tends to be a "blank check" and would require very close supervision by the Department in the field, as well as careful auditing of the costs of materials and services.

E. "Staged" Contract

Generally, this concept would cover any combination of the above contract types. It is recommended that in situations where well conditions exist, that a contract be prepared using several different contract stages.

F. Generic Plugging Requirements

General specifications and procedures which we recommend be included as conditions of each contract are listed below.

1. The Contractor shall submit to the Division of Mineral Resources a list of rigs and equipment he plans to use on this project. The Contractor's equipment shall pass all safety requirements of local, state, and federal agencies.
2. The Contractor shall furnish all labor, equipment, materials, and tools necessary to plug the referenced oil and gas well(s) according to these specifications.
3. Work shall be performed between the hours of 8:00 a.m. and 5:00 p.m., Monday through Friday. The Contractor shall not work weekends or State holidays. Any exception to the above work schedule must be approved in advance by the Regional Minerals Manager.
4. The Contractor shall notify the Regional Office of the Division of Mineral Resources a minimum of 48 hours in advance of commencement of plugging operations.
5. The Contractor shall be responsible for providing adequate access to the well site for his drilling rig and equipment. Any alterations to the natural topography required to provide ingress and egress to the well site must be approved by the Regional Minerals Manager before work begins.

6. Special attention shall be given to maintaining trees and other vegetation that have scenic value, provide shade, reduce erosion and runoff, or add to the aesthetics of the area.
7. The Regional Minerals Manager reserves the right to require the removal of any rods, tubing, casing, or liners that may be necessary to properly plug and abandon the well.
8. The Contractor shall run an operational string of casing when caving of the wellbore prevents further progress and the contract depth has not been reached.
9. If the contract depth cannot be reached, an adjustment may be made for materials and labor not required.
10. Cementing shall be accomplished by a reliable cementing company, and approved by the Regional Minerals Manager. All cement shall be pumped through tubing approved by the Regional Minerals Manager.
11. Cement used for plugging must be API Class A or State Transportation approved ASTM Type I cement. Cement slurry weight must average no less than 95 percent of the API Standard. A cement slurry used for plugging must develop a minimum compressive strength of 500 psi after 24 hours at wellbore temperature.
12. After plugging, the well shall be shut in gas-tight for at least 12 hours. If the cement settles, the wellbore or casing shall be refilled with heavy cement.
13. Casing shall be cut off 4 feet below grade. A steel cap with the API number shall be welded on top.
14. When a water well is associated with an oil or gas well, the Contractor shall clean out the water well to original depth and fill it with cement.
15. All fluids and salvaged well materials shall be removed from the premises and properly disposed of when the plugging operation is complete.

16. All trees, brush, stones, or other objectionable material disturbed during the plugging operation shall be removed from the site or, with the Regional Minerals Manager's approval, shall be buried.
17. The site shall be restored to the satisfaction of the Division of Mineral Resources. Disturbed grass areas must be seeded or sodded. If the area is seeded, the ground is to be worked to a depth of at least 3 inches and fertilized at a rate of 10 pounds per 1000 square feet. Grass seed shall be applied at a rate of 1 pound per 1000 square feet. Mulching of the area immediately following planting shall be at the rate of 2-3 bales of straw per 1000 square feet (bare ground will not be visible at this rate).
18. If crops are damaged and the Contractor cannot reach a settlement with the owner, the Division will determine the amount of damage based on estimates provided by the County Cooperative Extension Service.
19. All work, including restoration, shall be completed within a predetermined time period.

G. Site-Specific Specifications and Procedures

The individual requirements and procedures for plugging a well will need to be created on a case-by-case basis. In every case, however, the Plugging Guidelines presently under review by the Department will need to be followed.

Where little information is available for a well, the following procedures are suggested prior to attempting the actual cementing of the well:

1. Determine current total depth (top of old plugs, junk, or cavings).
2. Attempt to clean out the hole to original depth and, if possible, determine overall hole conditions.
3. Attempt to determine production intervals (oil, gas, and water).

4. Remove and inventory all uncemented casing and equipment (shoot, cut or wash over).
5. Determine any potential thief zones.
6. Diagram and catalog all information.
7. If a specific problem is being addressed, determine the point source so it may be isolated and properly secured.

1. The first part of the document discusses the importance of maintaining accurate records of all transactions and activities. It emphasizes that this is crucial for ensuring transparency and accountability in the organization's operations.

2. The second part of the document outlines the various methods and tools used to collect and analyze data. It highlights the need for consistent and reliable data collection processes to support informed decision-making.

3. The third part of the document focuses on the role of technology in data management and analysis. It discusses how modern software solutions can streamline data collection, storage, and reporting, thereby improving efficiency and accuracy.

4. The fourth part of the document addresses the challenges associated with data management, such as data quality, security, and privacy. It provides strategies to mitigate these risks and ensure that data is used responsibly and ethically.

5. The fifth part of the document concludes by summarizing the key findings and recommendations. It stresses the importance of ongoing monitoring and evaluation to ensure that data management practices remain effective and up-to-date.

APPENDIX B

KANSAS CORPORATION COMMISSION CONSERVATION DIVISION TEMPORARY ABANDONED WELL POLICY AND PROCEDURE EFFECTIVE MARCH 1, 1990

PURPOSE:

To implement a uniform procedure for addressing temporary abandoned well applications filed pursuant to K.A.R. 82-3-111.

PROCEDURE:

- I. Temporary abandoned well applications are to be submitted to the central office by the well operator on form CP-111, revised September 1989.
- II. A copy of the application will be mailed to the appropriate district office; the district office; the district will have 60 days in which to inspect the well to determine whether the application should be granted or denied.
 - A. TA applications received on wells which have been shut-in or inactive for a period in excess of 10 years will be automatically denied by letter from the district office. See attached automatic denial letter.
 - B. TA applications automatically denied by the central office will be numbered "W - (Dist. #) - xxxx." All other TA applications will be numbered by the districts as follows: "(Dist. #) - xxxx."
 - C. After inspection, the district will either:
 - (1) Grant TA status; or
 - (2) Deny TA status.

If TA status is denied, the district may exercise its discretion as to the time-frame for plugging or repairing the well. The time-frame is not to be less than 90 days if well conditions present a more immediate pollution threat. The 90-day time-frame may be exceeded only in certain instances.

If the denied TA well is repaired satisfactorily, the TA application may be reconsidered and granted.

APPROVAL/DENIAL CRITERIA:

- I. Well Construction.
 - A. Does well meet Alternate I/Alternate II surface pipe requirements?
 - B. If injection or disposal well, when was last MIT? Pass? Fail?
 - C. What is wellbore condition? Parted rods? Stuck pump? Holes in tubing or casing? Etc.?
 - D. How old is the well?
 - E. What is the fluid level?
 - F. What is total well depth?
 - G. Is pollution occurring?
 - H. What is overall environmental impact if well remains abandoned?
- II. Cause for TA Request.
 - A. If economic reasons are cited, look at how long well has been inactive. Has there been adequate economic incentive to operate the well during the inactivity period?
 - B. If future waterflood or disposal plans are indicated, does the wellbore condition support use for such purposes? Is well completed in zone of injection? Would well meet UIC criteria? Did the well pass MIT?
 - C. If intent is to reserve for future production, consider whether production equipment has been removed from the lease; past oil, gas, or water production from the well; overall condition of the lease.
- III. Other Considerations.
 - A. Does TA applicant have current oil and gas lease covering the well in question?
 - B. Operator's past compliance history as to well-related problems.

PLUGGING AGREEMENTS:

- I. A form agreement setting forth a plugging schedule for multiple wells will be prepared by legal staff. Form agreements are required for all wells which cannot be plugged within the 90-day time-frame. The agreement shall include, at a minimum, the following provisions:
 - A. Well plugging schedule;
 - B. plugging priorities (evaluated from an environmental risk standpoint);
 - C. plugging performance expectations; and
 - D. penalties for failure to adhere to the schedule.

- II. The district may exercise discretion in scheduling the current year's denied TAs for a particular operator up to one year from the date of denial. In setting plugging schedules, the following criteria should be considered:
 - A. Well conditions;
 - B. pollution potential;
 - C. number of wells denied TA status; and
 - D. operator financial condition.*

- III. Plugging schedules for more than one year may be allowed subject to review by central office technical and legal staff prior to submission of the agreement to the operator.

*Further guidelines for evaluating operator financial condition will be addressed in the near future.

COMPLIANCE:

- I. K.A.R. 82-3-111 currently establishes a \$100 penalty for failure to file a TA application. There is a 30-day notice of violation (NOV) process preceding penalty recommendation. NOV's are to be issued by the district with a copy to the central office compliance officer and to Topeka compliance tracking.

- II. Show cause proceedings will be instituted against operators who fail to plug or repair or to contact the district to make arrangements to plug or repair within 90 days from the date of denial. Operator default on written plugging agreements will also subject the operator to show cause proceedings.



APPENDIX C

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

JUN 22 1992

OFFICE OF
WATER

MEMORANDUM

SUBJECT: Management and Monitoring Requirements for Class II
Wells in Temporary Abandoned Status - Underground
Injection Control Program ~~Guidance #78~~

FROM: *f* James R. Elder, Director *James R. Elder*
Office of Ground Water and Drinking Water (WH-550)

TO: Water Management Division Directors
Regions II - X

BACKGROUND

One of the more longstanding issues associated with the Underground Injection Control (UIC) program concerns the establishment of consistent policy with regard to regulation of temporarily abandoned Class II injection wells. Although all State and Direct Implementation programs recognize both the existence of and need for temporary abandonment of injection wells, policy decisions and procedures for regulating these wells are not consistent from State to State. Definitions, notification requirements, inspection/monitoring activities, and reporting practices vary widely among the UIC programs. The only common characteristics of those wells defined as being "temporarily abandoned" is that injection operations have ceased for some measurable period of time and that the wells have not been permanently plugged.

Major concerns, relative to temporarily abandoned wells, raised by the Mid-Course Evaluation workgroup include:

- o relaxing of or completely exempting wells from monitoring standards and safeguards that are required of operating injection wells;
- o the absence of specific Federal and (in many instances) State regulations that require operators to notify the appropriate regulatory Agency when and under what circumstances a well has been temporarily abandoned;
- o the lack of a single common definition or class of

definitions (e.g., "shut-in" versus "temporarily abandoned") stating what constitutes a temporarily abandoned well.

The workgroup recommended that EPA develop a guidance to address these issues. A draft guidance was developed by the UIC Branch and has been reworked by the Class II Advisory Committee chartered on June 6, 1991. This Guidance has been endorsed by the Advisory Committee.

PURPOSE

The purpose of this Guidance is to set forth suggested minimum guidelines and procedures to promote a greater degree of consistency and standardization among the UIC programs in the regulation of temporarily abandoned Class II wells. In cases where State regulations are more stringent, then those regulations will take precedence over these guidelines.

Wells can be temporarily abandoned for several reasons. In some cases, they lack mechanical integrity, and it is not cost-effective for the owner/operator to repair them immediately. These wells are discussed in Guidance #76. This guidance only addresses wells which have been temporarily abandoned for other reasons, such as changes in production patterns or cessation of injection into a reservoir for economic reasons.

For the purpose of this guidance, EPA is using the term "temporarily abandoned" to connote a well in which injection will not take place for several months or years. A temporarily abandoned well is different from a "shut-in" well, which connotes an abrupt, short term cessation of injection in response to mechanical integrity failure or other mechanical problems or for the purpose of performing a well workover. EPA recognizes that the various States have different terminologies for "temporarily abandoned" wells. Accordingly, EPA does not believe that it is necessary to use a uniform definition as long as requirements are in place to assure that wells in which injection is not occurring for a prolonged period of time are not endangering underground sources of drinking water (USDWs).

GUIDANCE

Wells can be temporarily abandoned in either of two ways: "as is", that is with all tubular goods, valves, gauges, and other wellhead hardware in place, or the tubing-packer assembly may be pulled, along with some of the wellhead equipment. States may require that wells be temporarily abandoned in one specific way or another. For Direct Implementation programs and in most States, the procedure used to temporarily abandon the well is at

the operator's discretion.

1. For wells temporarily abandoned in an "as is" condition, the owner/operator should continue monitoring and testing of the wells as required in his permit. This would include monitoring of annulus pressure (if required), injection pressure and flow rate ("zeros" on the reporting forms would allow the UIC Director to ascertain the TA status of the well). In addition, the operator must perform mechanical integrity tests as required by the permits [40 CFR 144.28 (c)(2)(iv)(B)].
2. Where the operator chooses to change the configuration of the well during TA status, such changes must be approved by the UIC Director. If the changes make it unfeasible to continue the monitoring and testing procedures prescribed in the permit, the UIC Director should establish alternative monitoring and testing requirements.

Financial responsibility demonstration updates as required by UIC Program Guidance #65 (Guidance for Financial Responsibility in Federally-Administered UIC Class II Programs, March 29, 1989) must also be made for these wells. This is particularly important if production from the particular field or reservoir, in which the well is located, is not taking place presently and will not take place in the foreseeable future. It is important to ascertain that the owner/operator has other assets or means to properly plug and abandon the well in the event injection operations are not resumed.

All monitoring and testing programs should remain in force until such time as the wells are either put back in service or properly plugged and abandoned. The operators are required to notify the Director **prior to** returning a well to active injection status [40 CFR 144.28 (c)(2)(v)]. Where putting the wells back into service includes major changes to the well configuration (e.g., running the tubing and packer assembly back into the well) the operator must demonstrate mechanical integrity before injection operations can resume.

GUIDANCE IMPLEMENTATION

This document provides guidance to both primacy State and direct implementation UIC Directors on procedures to be followed with respect to Class II wells placed into temporarily abandoned status. The guidance is a general statement of policy. It does not establish or affect legal rights or obligations. It is not finally determinative of any or all of the issues addressed.

Agency decisions in any particular case will be made on the basis of specific facts and actions required to prohibit endangerment of USDWs.

Regional and State UIC program Directors are requested to take all appropriate action to incorporate this guidance into their programs. Implementation of the recommendations of this guidance will be discussed as part of the FY 1992 evaluation of State and Regional programs.

Questions and comments on this guidance should be addressed to Françoise Brasier, Chief of the UIC Branch at (202) 260-7077 or Jeff Smith of her staff at (202) 260-5586.

APPENDIX D

RESOURCE POTENTIAL ASSOCIATED WITH IDLE WELLS

The U.S. Department of Energy (DOE) prepared an analysis of the remaining resource potential that could be represented by the idle wells reported in the IOGCC survey. This analysis includes an estimation of potentially remaining crude oil resources that could be accessible through both conventional and enhanced recovery techniques. Data were not available to perform similar analysis of gas resource potential.

Methodology

Remaining oil resources associated with idle wells have been estimated for most producing states. The estimation methodology draws upon several primary data sources: the IOGCC estimates of idle wells and total producing wells; estimates of remaining recoverable reserves and potential enhanced oil recovery (EOR) resources developed using DOE's Tertiary Oil Recovery Information System (TORIS) database and recovery process models; conventional production decline curves based on data from Petroleum Information (PI) Corp.; and data on original oil in place (OOIP) by state from the American Petroleum Institute, updated with data from the Energy Information Administration. The TORIS reservoir data on which these assessments are based were recently reviewed and updated as a result of an IOGCC study evaluating the remaining light oil resource base (part of a continuing IOGCC project on Advanced Oil Recovery and the States). This study enhanced the data available for 23 major producing states. The methodology used in estimating remaining resources included the following steps:

1. Determined percentage of total wells (idle and producing) that are idle from IOGCC survey. In each case, the total idle well figure was divided by the total producing and idle wells, to arrive at an idle well percentage figure, as of 1991.
2. Based on an analysis of production data from PI and future EOR potential from TORIS, determined the remaining conventional reserves and potential EOR reserves (as of 1989, at a \$20/bbl oil price and current technology levels) for each reservoir. Reservoirs in the Permian Basin and heavy oil reservoirs in California were removed from the total reserves considered. The substantially larger enhanced recovery potential of these reservoirs than other reservoirs in these states would tend to overstate the potential associated with idle wells if not removed from the analysis. The reserve estimates were multiplied by the idle well percentage to determine estimated reserves associated with idle wells, and totaled for each state.

3. Reserves figures are extrapolated on an OOIP basis to account for the reservoirs not included in the database, using API/EIA data for statewide OOIP (1989), adjusted for the reservoirs removed from the analysis.

Using this methodology, the remaining conventional and EOR resource potential were estimated using three categories of idle wells:

- Wells idle with state approval.
- Wells idle without state approval but the operator is known and solvent.
- Wells idle without state approval and for which the operator is unknown or insolvent (orphan).

Inherent in this methodology are many assumptions, most of which will tend to make this estimate of idle well potential recovery optimistic. For example:

- Idle wells are assumed to be evenly distributed across reservoirs in each state according to the statewide ratio of idle to producing wells. In fact, one would expect a larger ratio of idle to producing wells in older, less productive fields.
- Estimates of statewide conventional recovery and EOR for TORIS reservoirs, as a percentage of OOIP, are assumed to be applicable to non-TORIS reservoirs based on their OOIP. In fact, non-TORIS reservoirs are typically smaller and less likely to support EOR projects. The removal of reservoirs known to have substantial ongoing EOR from the analysis helps to mitigate this overstatement, but does not eliminate it. On the other hand, remaining conventional recovery, as a percentage of OOIP, may be higher in the smaller, more recently discovered non-TORIS reservoirs than is estimated by applying a TORIS-based multiple.
- TORIS generated conventional recovery and EOR oil reserve estimates attributable to producing wells in 1989, and now assigned to idle wells, are assumed to not be recoverable from wells still on production at this time. In fact, a percentage of that oil would be recoverable from wells still producing, although over a longer time period.
- The advanced recovery estimates are based on EOR potential only, which could slightly understate future recovery potential. Some advanced secondary recovery (ASR) potential may also be associated with these idle wells. While most ASR potential is attributable to infill drilling, which would require new wells, some currently idle wells could

be converted to injectors for use in other ASR projects such as polymer-assisted waterflooding or profile modification.

- All idle wells are assumed to be economically reworkable and capable of production. In fact, this is probably not true due to location, mechanical problems, and length of time the well has been idle.

Taken together, these assumptions define an upper boundary on the remaining oil resource potential associated with currently idle wells. Accounting for these factors would have required several arbitrary adjustments to the results.

Results

Table 1 provides a summary of the estimates of resource potential by state. The table includes the estimation of the resource recovery potential associated with idle wells that have not been orphaned (idle with state approval or without state approval, but where the operator is known and solvent) based on reservoirs in TORIS and the extrapolated values for statewide totals. Total remaining conventional recovery potential associated with idle wells that have not been orphaned could be as high as 2.6 billion barrels (BB). Application of EOR techniques utilizing these currently idle wells could add 0.5 BB in incremental future recovery. Idle wells provide the reservoir access through which this remaining potential can be tapped. Without these wells, this recovery potential could be lost.

TABLE 1

Estimated Oil Resource Potential Associated With Idle Wells*
 At \$20/Bbl Oil Price
 (Million Barrels)

	TORIS Reservoirs		Statewide	
	Conventional Recovery	EOR	Conventional Recovery	EOR
California	419	44	489	52
Colorado	70	0	160	0
Louisiana	83	83	124	125
Mississippi	55	0	107	0
New Mexico	25	23	41	37
Oklahoma	16	0	28	0
Texas	575	111	976	189
Utah	31	25	51	42
Other States**	254	19	624	91
Total U.S.	1,528	305	2,600	536

*Wells that have been orphaned are not included

**AL, AR, KS, KY, MI, MT, NE, ND, WY. Available information for these states provides a less reliable basis for extrapolation.

APPENDIX E

STATE OFFICIALS PROVIDING INFORMATION FOR THIS REPORT

ALABAMA

Dr. David E. Bolin
State Oil & Gas Board
Box O
Tuscaloosa, AL 35486-9780
(205) 349-2852

ALASKA

David W. Johnston
Oil and Gas Conservation Commission
3001 Porcupine Drive
Anchorage, AK 99501-3192
(907) 279-1433

ARIZONA

Steven L. Rauzi
Arizona Geological Survey
845 N. Park Avenue, Suite 100
Tucson, AZ 85719
(602) 882-4795

ARKANSAS

Martin T. Perdue
Oil and Gas Commission
P.O. Box 1472
El Dorado, AR 71731-1472
(501) 862-4965

CALIFORNIA

James T. Campion, Jr.
Department of Conservation
Division of Oil and Gas
801 K Street, MS 20-20
Sacramento, CA 95814-3530
(916) 445-9686

COLORADO

Dennis Bicknell
Oil and Gas Conservation Commission
1580 Logan Street, Suite 380
Denver, CO 80203
(303) 894-2100

FLORIDA

Dr. Charles H. Tootle
903 W. Tennessee
Gunter Building
Tallahassee, FL 32304-7700
(904) 488-4191

ILLINOIS

Lawrence E. Bengal
Oil and Gas Division
P.O. Box 10140
Springfield, IL 62791-0140
(217) 782-1689

INDIANA

Gary M. Fricke
Division of Oil and Gas
402 W. Washington St., Room 293
Indianapolis, IN 46204
(317) 232-4055

KANSAS

William R. Bryson
Oil and Gas Conservation Division
1500 SW Arrowhead Road
Topeka, KS 66604-4027
(913) 271-3233

KENTUCKY

D. Michael Wallen
Oil and Gas Division
P.O. Box 14090
Lexington, KY 40512-4090
(606) 254-0367

LOUISIANA

John R. Aldridge
Office of Conservation
P.O. Box 94275
Baton Rouge, LA 70804-9275
(504) 342-5500

MICHIGAN

Samuel L. Alguire
Geological Survey Division
Box 30256
Lansing, MI 48909
(517) 334-6951

MISSISSIPPI

Dr. A. Richard Henderson
State Oil and Gas Board
500 Greymont Avenue, Suite E
Jackson, MS 39202
(601) 354-7114

MISSOURI

Kenneth L. Deason
Department of Natural Resources
P.O. Box 250
Rolla, MO 65401-0250
(314) 364-1752

MONTANA

J.W. Halvorson
Board of Oil and Gas Conservation
2535 St. John's Avenue
Billings, MT 59102
(406) 656-0040

NEBRASKA

Paul H. Roberts
Oil and Gas Conservation Commission
P.O. Box 399
Sidney, NE 69162
(308) 254-4595

NEVADA

Kathy Loomis
Department of Minerals
400 W. King Street, Suite 106
Carson City, NV 89710
(702) 687-5050

NEW MEXICO

Jerry T. Sexton
Oil Conservation Division
P.O. Box 1980
Hobbs, NM 88240
(505) 393-6161

NEW YORK

Donald J. Drazan
Division of Mineral Resources
50 Wolf Road, Room 202
Albany, NY 12233-6500
(518) 457-9337

NORTH DAKOTA

Marvin D. Rygh
Industrial Commission
P.O. Box 8156
Grand Forks, ND 58202-8156
(701) 777-2231

OHIO

Donald L. Mason
Division of Oil and Gas
Fountain Square, A3
Columbus, OH 43224
(614) 265-6893

OKLAHOMA

Michael W. Schmidt
Oil and Gas Conservation Division
253 Jim Thorpe Building
Oklahoma City, OK 73105
(405) 521-4172

PENNSYLVANIA

James E. Erb
Bureau of Oil and Gas Management
Box 2357
Harrisburg, PA 17105-2357
(717) 787-4817

SOUTH DAKOTA

Fred V. Steece
Dept. of Environmental & Natural Res.
36 E. Chicago Street
Rapid City, SD 57701
(605) 394-2229

TENNESSEE

Ronald P. Zurawski
Division of Geology
13th Floor, L&C Tower
401 Church Street
Nashville, TN 37243-0445
(615) 532-1504

TEXAS

James W. Walker, Jr.
Oil and Gas Division
P.O. Box 12967, Capitol Station
Austin, TX 78711-2967
(512) 463-6838

WEST VIRGINIA

Theodore M. Streit
Division of Environmental Protection
#10 McJunkin Road
Nitro, WV 25143-2506
(304) 759-0514

UTAH

Ronald J. Firth
Division of Oil, Gas and Mining
355 W. North Temple
3 Triad Center, Suite 350
Salt Lake City, UT 84180-1203
(801) 538-5340

WYOMING

Donald B. Basko
Oil and Gas Conservation Commission
P.O. Box 2640
Casper, WY 82602
(307) 234-7147

VIRGINIA

B.T. Fulmer
Division of Oil and Gas
P.O. Box 1416
Abingdon, VA 24210
(703) 676-5423

