Executive Summary

The Oil and Gas Act (58 P.S. §§ 601.101 - 601.605), which was signed into law in December 1984 and became effective April 18, 1985, established an Abandoned Well Restricted Revenue Account for use by the Department of Environmental Protection (DEP) in carrying out its activities under the Act and to plug abandoned wells causing health, safety, or environmental problems. This fund received revenues from fines, fees and penalties and from a $50 surcharge on all oil and gas well drilling permits which was to be dedicated to well plugging.

Act 78 of 1992, which went into effect on August 1, 1992, amended the Oil and Gas Act by creating a category of "orphan" wells, abandoned prior to April 18, 1985. "Orphan" wells have not been affected by the present owner or operator, and from which the present owner, operator or lessee has received no economic benefit, except as a landowner or recipient of royalties. An Orphan Well Plugging Fund was established to cover the cost of plugging these wells. Revenues from a $100 surcharge on new oil wells and a $200 surcharge on new gas wells were provided to fund the well plugging until the number of orphan wells and projected cost for plugging them could be determined, and a plugging program based on those projections could be developed. Additionally, the $50 surcharge previously placed into the Abandoned Well Restricted Revenue Account was placed into a newly created Abandoned Well Plugging Fund while fines, fees and penalties were appropriated to DEP for carrying out the purposes of the Act.

DEP has records on just over 140,500 of the estimated 325,000 oil and gas wells drilled in Pennsylvania since 1859. Approximately 88,300 are operating wells with known operators who are responsible for plugging them when they reach the end of their useful life. If these operators refuse to properly plug these wells at the end of their life, enforcement actions such as administrative orders, consent orders, civil penalties, and imprisonment, can and have been used to assure that proper plugging occurs. An additional 44,700 wells are known to be plugged.

Under the Oil and Gas Act and Act 78, the Department has plugged 94 "orphaned" or "abandoned" wells since 1988. Another 7,469 "orphaned" or "abandoned" wells, those with no responsible owner and that were never subject to a bonding requirement, still need to be plugged. Orphan wells are located in 25 counties. Most are located in the northwestern part of the state. Over 80% are located in the shallow oil fields of McKean, Warren, Venango and Forest counties.

Around 550 orphan wells are known to be causing health, safety or environmental problems. These problem wells are a high priority for plugging with funds from both the Orphan Well Plugging Fund and the Abandoned Well Plugging Fund. The locations and status of the remaining estimated 184,500 wells are unknown.

Since 1992, there has been $438,950 collected into the Abandoned Well Plugging Fund. An additional $1,568,200 has been collected into the Orphan Well Plugging Fund. Since DEP began plugging orphan wells in 1988, $2,315,779.05 has been spent or encumbered to plug 94 orphan wells under 58 contracts. Most of these wells were leaking or were on public lands. Per well plugging costs have ranged from $3,730 to $273,600 with an average cost of approximately $24,600. (Note: the $273,600 plugging contract involved unusual circumstances that are not anticipated to be encountered again. A family of four was hospitalized after gas leaking from the well entered their house and caused an explosion and fire, destroying the house.) When unusual situations are encountered, such as locations that are difficult to access, obstructions in the well bore, cave-ins in or around the well, or stuck casing or tubing, the average plugging cost (excluding the $273,600 well) has been around $22,000 per well. Where unusual situations are not encountered, the average plugging cost has been approximately $6,000 per well.

Based on the average plugging cost of $22,000, it is estimated that it will cost approximately $12,000,000 to plug the 550 “orphan” or “abandoned” wells known to be causing problems. Average annual revenues into the Abandoned Well Plugging Fund and Orphan Well Plugging Fund have been approximately $300,000. This level of funding is inadequate for plugging all of the problem orphan wells within a reasonable time period.

Based on experience and the locations and types (shallow oil versus deeper gas) of orphan wells that have been identified, it is estimated that 90% of orphan wells not causing problems can be plugged at an average cost of $6,000 per well, or a estimated total cost of $37,000,000. The remaining 10 percent could be plugged at an average cost of $22,000 per well, or an estimated total cost of $15,000,000. If these estimates are accurate, the cost for plugging all identified orphan wells is about $64,000,000.

Background

The first commercial oil well was drilled near Titusville in 1859. Plugging requirements designed to protect oil producing formations from flooding by fresh water were enacted by the Legislature in the 1890's. Legislation passed in 1921 specified methods for pulling casing and plugging wells. It wasn't until 1956 that legislation required gas wells to be permitted so their locations could be coordinated with underground coal mining to assure the safety of coal miners. The same legislation was amended in the early 1960s to require all oil and gas wells to be permitted. These initial permits were registrations of locations where well drilling was being considered. After the Arab oil embargo in the 1970s, and the resulting drilling boom of the late 1970s and early 1980s, more comprehensive oil and gas legislation was enacted. In December 1984, the Oil and Gas Act was signed into law. This statute provided for, among other things, an Abandoned Well Restricted Revenue Account and the registration of wells drilled prior to the permitting requirements. The Abandoned Well Restricted Revenue Account was to be used by DEP to plug abandoned wells causing health, safety, or environmental problems and for carrying out other purposes of the Act. This fund received revenues from fines, fees and penalties and from a $50 surcharge on all oil and gas well drilling permits.

In the 138 years since the first oil well was drilled, an unknown number of oil and gas wells have been drilled in Pennsylvania. An estimate by the Independent Petroleum Association of America places that number at approximately 325,000. DEP has records of 88,300 operating wells which it regulates, 44,700 plugged wells, and around 7,500 orphan and abandoned wells. The status of the remaining 184,500 wells is unknown. Many wells were drilled, operated, and plugged at the end of their useful life while others were drilled, operated and abandoned without proper plugging. Some wells were "temporarily abandoned" while the operators waited for the price of oil to rise to a level which would make producing the wells profitable, which sometimes did not occur.

With the passage of the well registration requirements of the Oil and Gas Act, questions arose concerning plugging liability for wells that were abandoned years ago by prior, often unidentified, operators. Consequently in 1992, the Legislature amended the Act to establish an orphan well plugging program. The orphan well plugging program is funded by the industry through a $100 surcharge on new oil well permit fees and a $200 surcharge on new gas well permit fees. The Orphan Well Plugging Fund is separate from, and in addition to, the Abandoned Well Plugging Fund which was established with the $50 surcharge from the Abandoned Well Restricted Revenue Account of 1984.

The Orphan Well Program

Section 601 of the Oil and Gas Act, as amended, established the first of two well plugging funds. Section 601(b) states:

> "To aid in the indemnification of the Commonwealth for the cost of plugging abandoned wells, there shall be added to the permit fee established by DEP under section 201 for

new wells a $50 surcharge. All moneys collected as a result of this surcharge shall be paid into the State Treasury into a restricted revenue account to be known as the Abandoned Well Plugging Fund, hereby established, and shall be expended by the department to plug abandoned wells which threaten the health and safety of persons or property or pollution of the waters of the Commonwealth."

Under the second fund, the Orphan Well Plugging Fund, an orphan well is defined, in Section 103 of the Act as:

> "Any well abandoned prior to the effective date of this act that has not been affected or operated by the present owner or operator and from which the present owner, operator or lessee has received no economic benefit, except only as a landowner or recipient of a royalty interest from the well."

Since an unknown number of wells were abandoned without proper plugging prior to the effective date of the Act (April 18, 1985), it is impossible to know how many wells fall within the scope of this definition. In order to assist in determining the number and location of orphan wells, a process was established for identifying and reporting wells which qualified for orphan well status. Section 203 states, in part:

> "(a) . . . Any well owner or operator who registers a well pursuant to this subsection and any well owner or operator who has previously registered a well pursuant to this act shall, within one year of the effective date of this amendatory act, identify any abandoned well on property such well owner or operator owns or leases and request approval from the department for classification of the well as an orphan well . . ."
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> "(a.1) After expiration of the one-year period provided in subsection (a), well owners or operators who discover abandoned wells on property purchased or leased by them shall identify such well to DEP within 60 days of discovery and advise the department that they are seeking classification of such well as an orphan well . . ."
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> "(a.2) Persons who are not well owners or operators and who discover an abandoned well on property owned or leased by them shall identify such well to DEP within 60 days of discovery and shall advise DEP that they are seeking classification for such well as an orphan well . . ."

When DEP approves orphan well status, DEP assumes plugging responsibility, regardless if the well is actually causing a problem, unless an operator who benefited from the well since April, 1979 (five years prior to passage of the Act) can be identified. However, DEP gives plugging priority to those wells that are causing problems. Section 210(a) of the Act states, in part:

"(a) Upon abandoning any well, the owner or operator thereof shall plug the well . . . unless . . . the well has been approved by DEP as an orphan well pursuant to section 203. Where DEP determines that a prior owner or operator received economic benefit, other than economic benefit derived only as a landowner or from a royalty interest, subsequent to April 18, 1979, from an orphan well . . ., such owner or operator shall be responsible for the plugging of the well . . ."

DEP was provided authority to enter private property to plug orphan wells and to salvage any equipment that might be present to help offset the cost of well plugging. Section 210 (e) states, in part:

"(e) If a well is an orphan well . . . DEP shall have the right to enter upon the well site and plug the well and to sell such equipment, casing and pipe . . . as may have been used in the production of the well in order to recover the costs of plugging . . ."

A funding mechanism was established to provide funds for plugging orphan wells. It was determined that, until the scope of the orphan well problem could be determined, these funds should be provided by the oil and gas industry. Section 601(c) of the Act states:

"(c) (1) There is hereby created a restricted revenue account to be known as the Orphan Well Plugging Fund. There shall be added to the permit fee established by DEP under section 201 for new wells a $100 surcharge for wells to be drilled for oil production and a $200 surcharge for wells to be drilled for gas production, which surcharges shall be placed in the Orphan Well Plugging Fund and shall be expended by DEP to plug orphan wells. If an operator rehabilitates a well abandoned by another operator or an orphan well, the permit fee and the surcharge for such well shall be waived.

(2) DEP shall conduct a study of its experience in implementing this section and shall report its findings to the Governor and the General Assembly within five years of the effective date of this amendatory act. The report shall contain information related to the balance of the fund, the number of wells plugged, the number of identified wells eligible for plugging and any recommendations on alternative funding mechanisms.

(3) Expenditures by DEP for the plugging of orphan wells shall be limited to fees collected under this act and in no event shall moneys from the General Fund be expended for this purpose."

The Orphan Well Plugging Funds

The fee for all new well permits issued under the Oil and Gas Act has included a $50 surcharge for the Abandoned Well Plugging Fund. Since April 18, 1985 approximately $830,000, or an average of about $70,000 per year, has been collected into the fund.

Since August 1992, applications for new well permits included an additional surcharge of $100 for oil wells, or $200 for gas wells. Revenues into the Orphan Well Plugging Fund relate directly to the amount and type of well drilling activity. Nearly 80% of new well permits issued since 1992 have been for gas wells. Since the Orphan Well Plugging Fund was established, just over $1,150,000 have been collected into the fund. Average annual revenues over the five years have been approximately $230,000.

As of December 10, 1997, DEP has spent $2,196,677.49 plugging 94 orphan wells. An additional $119,101.56 has been encumbered under outstanding contracts for these wells, resulting in a total cost of $2,315,779.05. There is a balance of $998,371.45 in the two funds.

The Orphan Well Inventory

As of December 10, 1997, 7,563 wells had been identified and approved as orphans. Ninety-four have been plugged since 1988, leaving 7,469 still to be plugged. 550 of those wells are known to be causing health, safety or environmental problems. Orphan wells have been identified in 25 counties and are distributed as follows:

County	Total	Plugged	Remaining
Allegheny	80	7	73
Armstrong	118	5	113
Beaver	18		18
Bradford	4		4
Butler	401	4	397
Cameron	8		8
Clarion	202	2	200
Clinton	40		40
Crawford	52	4	48
Elk	168	7	161
Erie	29	1	28
Fayette	7		7
Forest	181	2	179
Greene	39	1	38
Indiana	32		32
Jefferson	106	3	103
Lawrence	6		6
McKean	3,236	27	3,209
Mercer	45	1	44
Potter	103	5	98
Tioga	39	5	34
Venango	1,261	12	1,249
Warren	1,203	2	1,201
Washington	131	1	130
Westmoreland	45	5	40

The majority of orphan wells are located in the northwestern part of the state. Over 80% are located in the historic, shallow, oil fields of McKean, Warren, Venango and Forest Counties. Nearly all of these wells were identified within the first year as specified in Section 203 of the Act. Orphan wells are continuing to be reported as they are discovered, at an average rate of 15-20 per month.

Orphan Well Plugging Experience

Since 1988, DEP has completed the plugging of 94 orphan wells under 58 contracts. Most of these wells were leaking or were on public lands. The total cost for plugging these wells was $2,315,779.05. Of this amount, $706,311.33 was from the Well Plugging Restricted Revenue Account established in 1984, $116,381.34 was from the Abandoned Well Plugging Fund, $717,556.66 was from the Orphan Well Plugging Fund, $135,320.30 was from Non-Point Source Funds under the Federal Clean Water Act, and $45,676.69 was from the Federal Oil Spill Liability Trust Fund. Per well plugging costs have ranged from $3,730 to $273,600 with an average cost of approximately $24,600. The $273,600 plugging contract involved unusual circumstances that are not anticipated to be encountered again. A family of four was hospitalized after gas leaking from the well entered their house and caused an explosion and fire, destroying the house.

Experience from well plugging contracts has shown that when there are problems associated with well plugging, such as locations that are difficult to access, obstructions in the well bore, cave-ins in or around the well, or stuck casing or tubing, the average plugging cost (excluding the $273,600 well) has been around $22,000 per well. Most of the orphan wells plugged to date were leaking oil, gas or brine, and had problems associated with plugging as indicated above. These problem wells were intentionally plugged first. Where no problems are encountered, the average plugging cost has been approximately $6,000 per well. Plugging problems are not anticipated at a vast majority of orphan wells. In comparison with other states, orphan well plugging costs generally range from $8,000 to $17,000 with an average cost of about $12,000 for shallow oil wells in Ohio, and generally range from $12,000 to $25,000 with an average cost of around $19,000 in West Virginia.

Based on the $22,000 average plugging cost for problem wells, it is estimated that it will cost approximately $12,000,000 to plug the 550 "orphaned" or "abandoned" wells known to be causing health, safety or environmental problems.

Based on plugging experience and the locations (rural versus suburban locations) and types (shallow oil versus gas) of orphan wells that have been identified, it is estimated that 90% of the orphan wells which are not causing problems could be plugged at an average cost of $6,000 per well, or a cost of approximately $37,000,000. It is estimated that the remaining 10% of orphan wells could be plugged at an average cost of $22,000 per well, or a cost of $15,000,000. The total estimated plugging cost for all orphan wells, identified to date, is around $64,000,000.

Other States' Funding Mechanisms

Well plugging funding mechanisms in other states were reviewed. In December 1996, the Interstate Oil and Gas Compact Commission published a report, *Produce or Plug - the Dilemma over the Nation's Idle Oil and Gas Wells*. That report indicates that nine member states (Alaska, Arizona, Idaho, Maryland, Nebraska, Nevada, Oregon, South Carolina, and South Dakota) have no well plugging funds. Eight states (Alabama, Florida, Illinois, New York, North Dakota, Texas, Virginia, and West Virginia) fund their well plugging programs through permit fees. Seven states (Colorado, Kansas, New Mexico, Ohio, Oklahoma, Utah, and Wyoming) use a percentage of gross production assessment or tax to plug orphan wells. Four states (Missouri, New York, Tennessee, and Texas) use penalty assessments for well plugging. Three states (Arkansas, California, Mississippi) fund plugging programs from general appropriations. Michigan uses general obligation bonds for plugging wells. Kentucky funds its well plugging program from forfeited oil and gas well bonds. Pennsylvania is unique in its use of a permit surcharge to fund well plugging programs.

As indicated above, average annual revenues into the Abandoned Well Plugging Fund have been around $70,000, and revenues into the Orphan Well Plugging Fund have been approximately $230,000, for a total of about $300,000 per year. If that average rate continues, it will take about 210 years to generate sufficient funds to plug the orphan wells currently on the list.

The permit application fee in Pennsylvania for drilling or altering an oil or gas well is $100. Over the past five years 7,979 permits were issued, resulting in revenues of $797,900. This is an average of just under $160,000 per year. Over the past five years, penalties collected for violations at oil and gas wells have totaled just under $526,000, or an average of about $105,000 per year. Fines, fees, and penalties are placed into a special fund used for administrative functions, including salaries for staff responsible for plugging orphan and abandoned wells.

Since April 18, 1985, the effective date of Oil and Gas Act bond requirements for wells, DEP has forfeit six bonds. These were all $25,000 blanket bonds. Bond forfeiture is considered a last resort enforcement action. Penal bond forfeitures as presently applied do not represent a significant source of revenues for addressing the orphan well plugging liability.

Recommendations

Most orphan wells are abandoned oil wells. Oil wells in Pennsylvania produce an average of around 1/3 bbl/day. At $20/bbl, each oil well yields net revenues under $7/day. Obviously, oil producers do not generate enough revenues to contribute to plugging orphan wells. Subsequently, placing the burden of funding an orphan well program of this magnitude on Pennsylvania's gas producers would raise equity issues.

When considering funding mechanisms to generate $64,000,000 to plug orphan wells in Pennsylvania within a reasonable time frame, the oil and gas industry does not appear to be a viable source of revenues based on the marginal production of oil and gas in Pennsylvania. As indicated above, the well plugging funds generate about $300,000 per year. If the $90,000 generated from surcharges, permit fees, penalties, and bond forfeitures were added to the plugging funds, total revenues of about $390,000 per year could be expected. At that level of funding, it would take more than 160 years to plug the presently identified orphan wells. If all those funds were used to only plug the 550 presently identified problem wells, it would still take 28 years to complete the $12,000,000 worth of work.

While the majority of states fund well plugging programs directly from industry fees (permit fees, severance tax, penalties, bond forfeiture, or permit surcharge), several states use general funding sources (general appropriations or general bond obligations). Based on the above discussion, similar measures appear appropriate for Pennsylvania. Funding sources such as a general bond obligation, or other source, should be considered.