2014

Oil and Gas Annual Report

pennsylvania
DEPARTMENT OF ENVIRONMENTAL
PROTECTION

Message from the DEP Secretary

Before joining the Department of Environmental Protection (DEP) as Acting Secretary in January 2015, Governor Wolf shared with me his vision for the future of the department. Of course, DEP has broad responsibilities to carry out its mission to ensure the protection of Pennsylvania's air, water and land resources. However, rather than assigning a "to-do" list or prescribing a multi-step plan, the governor focused exclusively on the importance of embedding two guiding principles into the fabric of the department…Transparency and Integrity.

This "2014 Oil and Gas Annual Report" delivers on these principles through the sharing of valuable information with the public. Specifically, this report includes data and trends related to the department's permitting and inspection programs. Also highlighted in this report is a summary of important policy and regulatory developments, notable accomplishments achieved during 2014 and a glimpse of what to expect from DEP in 2015.

I am pleased to share this report with you and look forward to providing additional tools over the coming year that will continue to promote transparency and integrity.

Sincerely,

John Quigley
Secretary

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Disclaimer: The information contained in this report is based on the data contained in DEP information systems at the time of the publication of this report, including, but not limited to, the department's enterprise-wide permitting and compliance database called eFACTS (Environment Facility Application Compliance Tracking System). As some data contained in these systems are self-reported by operators and other permitees, data in this report reflects the data as reported to the department.

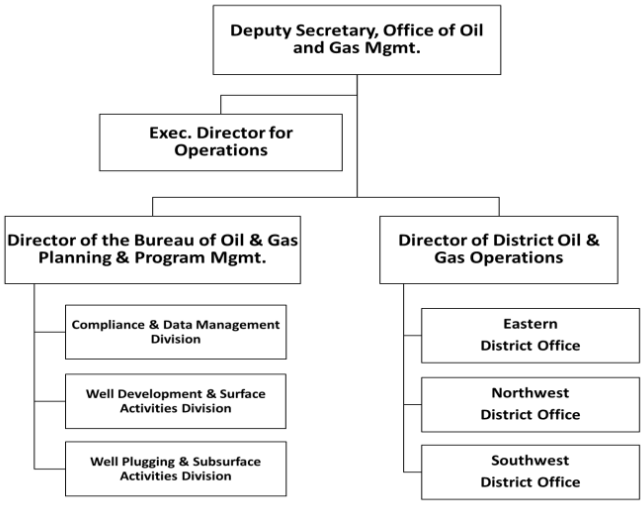
DEP's MISSION:

The mission of the Department of Environmental Protection (DEP) is "***to protect Pennsylvania's air, land and water from pollution and to provide for the health and safety of its citizens through a cleaner environment. We will work as partners with individuals, organizations, governments and businesses to prevent pollution and restore our natural resources***."

In Pennsylvania, DEP is responsible for issuing permits and conducting inspections at oil and gas well sites, pipelines and compressor stations. The Public Utility Commission (PUC) and the Federal Department of Transportation's Pipeline and Hazardous Materials Safety Administration (PHMSA) also play a vital role in the inspection of natural gas gathering and transmission pipelines in Pennsylvania for safety purposes.

DEP'S OFFICE OF OIL AND GAS MANAGEMENT:

DEP's Office of Oil and Gas Management employs 227 professionals who are dedicated to administering an internationally recognized oil and gas program. In 2014, DEP increased its staff resources by more than 12 percent through the addition of 25 positions to better meet the ongoing program needs of the Commonwealth. The office consists of two bureaus. The current organization chart for the Office of Oil and Gas Management is depicted to the right.



The Bureau of Oil and Gas Planning and Program Management is located in DEP's central office (Harrisburg) and is responsible for administrative, policy and regulatory development functions. The Bureau of District Oil and Gas Operations consists of three district oil and gas offices and is responsible for permitting, inspection, compliance and enforcement functions.

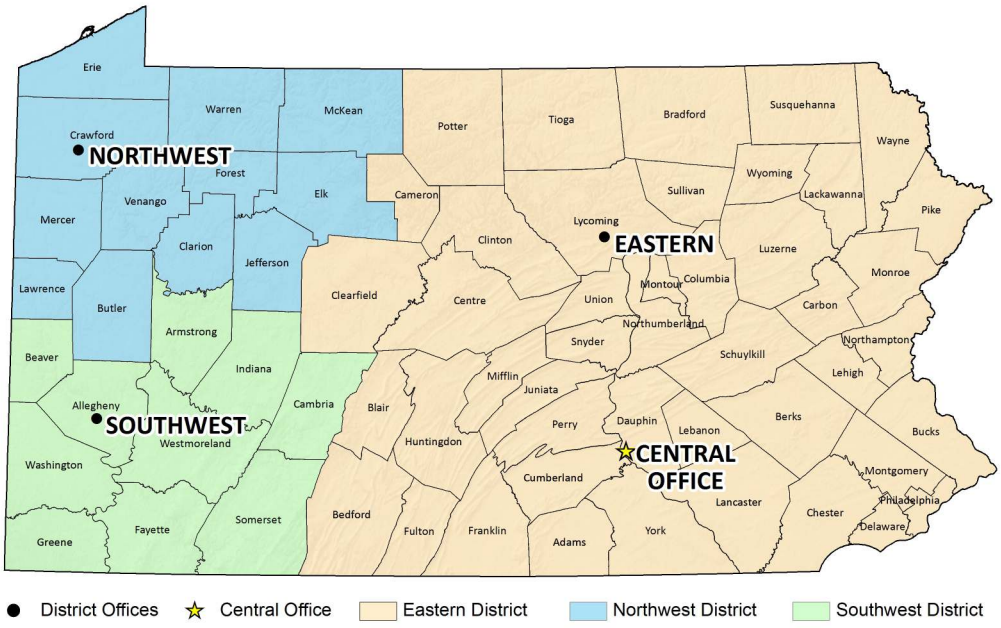
The Bureau of Oil and Gas Planning and Program Management includes the following three divisions:

- *Well Development and Surface Activities* – This division is responsible for developing policies and guidance related to surface activities associated with oil and gas well site design and construction. This includes engineered well pad components such as erosion and sediment control structures, pits and impoundments.

- *Well Plugging and Sub-Surface Activities* – This division consists of the Subsurface Activities Section and the Well Plugging Section. The Subsurface Activities Section is responsible for the management of subsurface oil and gas related program services and activities and offers expertise in the subjects of drilling, casing, cementing, completion, stimulation, workover, and production activities and operations associated with conventional and unconventional hydrocarbon formations in Pennsylvania. The Well Plugging Section maintains and implements the successful Orphaned and Abandoned Well Plugging Program.

- *Compliance and Data Management* – This division works closely with DEP's Bureau of Information Technology to oversee the operation and maintenance of data management systems and databases that track production and other data that are submitted to DEP by the regulated community.

The Bureau of District Oil and Gas Operations includes three district offices that implement the operational programs in the eastern, northwest, and southwest areas of the Commonwealth. Staff in the district offices are responsible for permitting and inspecting oil and gas well sites and gathering lines and responding to complaints. The district staff are also responsible for compliance and enforcement activities. The district offices are located in Williamsport, Meadville and Pittsburgh.



PENNSYLVANIA'S OIL AND GAS RESERVES:

For centuries, Pennsylvania has been recognized for its abundant natural resources. During the early days of this nation, the vast forests of “Penn's woods” provided timber that was used to construct buildings and homes in towns across the Commonwealth and neighboring states. Pennsylvania's coal resources fueled industries during the late 1800s and was used in the production of steel that was critical to development of this country's infrastructure. Pennsylvania's oil and gas reserves have played a vital role in meeting the energy demands of this country.

Conventional vs. Unconventional Oil and Gas Drilling

Two terms are commonly used to describe oil and gas exploration. "Conventional" and "unconventional" can refer to the type of well that is drilled or the geologic formation into which drilling occurs. Both terms are specifically defined in Chapter 78, Subchapter A of Pennsylvania's oil and gas regulations.

In general, a "conventional" well is a well that is drilled into permeable geologic formations, such as sandstone, which have accumulated oil or gas over centuries.

An "unconventional" well typically refers to a well that is drilled into impermeable geologic formations, such as shale, which require horizontal well drilling and high volume hydraulic fracturing to expose more of the formation to the well bore. Hydraulic fracturing is also commonly used to develop conventional wells, although there are significant differences between conventional and unconventional well fracturing. The amount of water required to hydraulically fracture a conventional well is much less on a per-well basis because the geologic formations targeted are much more porous.

In 2014, DEP produced a short video to educate the public about the method of unconventional drilling. To view this video, click here

Oil

The exploration and production of oil is not new to Pennsylvania. In fact, the first commercial oil well was successfully drilled in 1859 by Edwin Drake in Titusville, Pennsylvania. This was the birth of what was to become the nation's petroleum industry. Today, much of the nation's oil production occurs in states such as Texas, North Dakota, Oklahoma, California and Alaska. However, Pennsylvania's conventional "oil patch" in the northwest corner of the state continues to yield Pennsylvania Grade crude oil. This particular oil is paraffin-based, renowned for its lubricating qualities and is used in the manufacture of petroleum lubricants such as motor oils and as an ingredient in consumer products such as cosmetics, ointments and lotions.

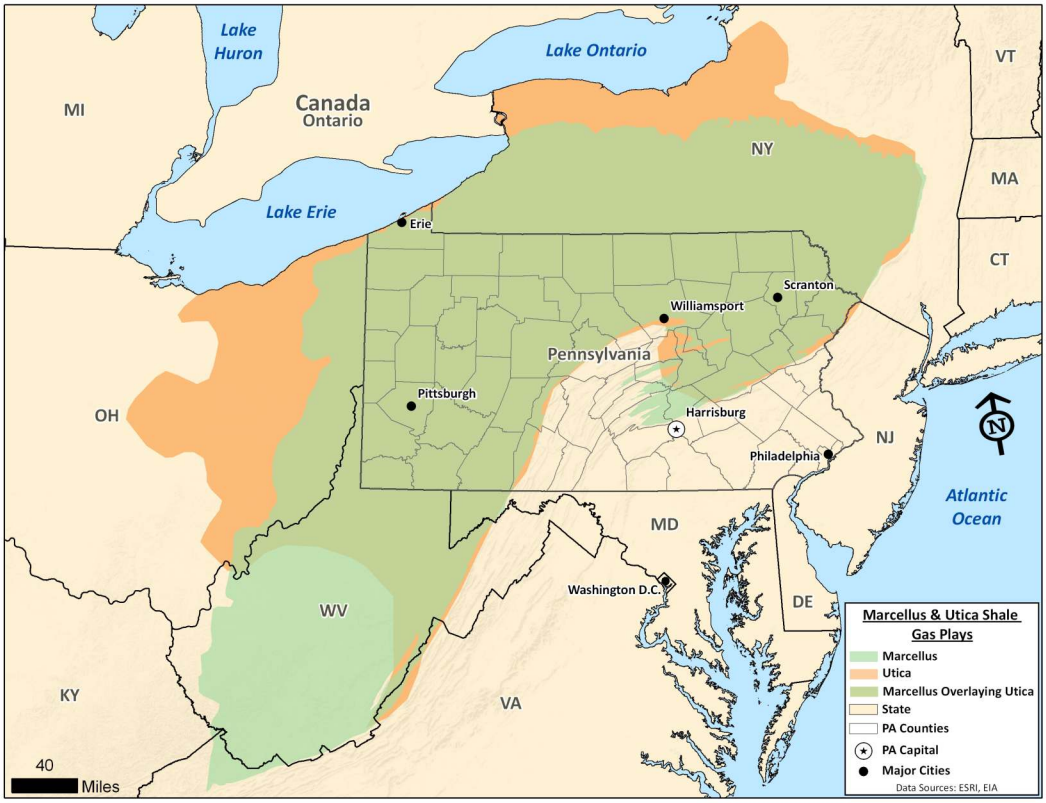
Natural Gas

In addition to historic oil reserves, Pennsylvania has also been a source of natural gas for more than a century. Although it had been suspected that deposits of natural gas existed within vast tight shale formations deep under Pennsylvania's surface, conventional extraction methods were unable to effectively unlock the natural gas from its source and the actual quantities were not well understood.

By 2005, horizontal drilling methods combined with high-volume hydraulic fracturing techniques were beginning to be successfully and economically deployed to capture natural gas from Pennsylvania's shale deposits.

PENNSYLVANIA'S SHALE PLAYS:

Unconventional shale basins are commonly characterized according to the geologic formation that serves as the source of the shale gas. The term “shale play” is used by the oil and gas exploration and development industry to identify areas of shale basins that appear to be particularly suitable for shale gas development. The current predominant shale play in Pennsylvania is the “Marcellus Shale Play.” However, interest is beginning to increase in the exploration and production of the “Utica Shale Play” that lies well below the Marcellus Shale Play. Other less familiar shale plays in and around Pennsylvania include the Rhinestreet, Huron and a collection of less extensive formations that comprise the Upper Devonian series.



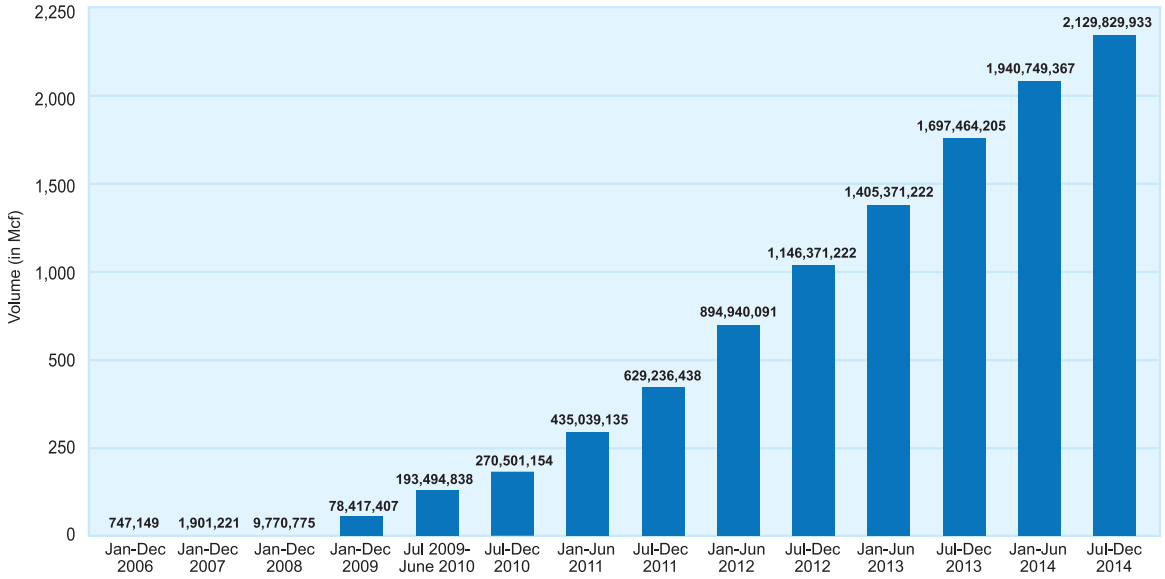
OIL AND GAS PRODUCTION IN PENNSYLVANIA

Since 2008, Pennsylvania's natural gas production has increased dramatically, resulting in increased energy security as a result of less dependence on fossil fuels from other parts of the world. Increased shale gas production has resulted in a number of significant benefits including less expensive energy costs and improvements to Pennsylvania's air quality as a result of the increased use of cleaner burning natural gas.

Today, vast areas of black shale deposits in Pennsylvania are yielding tremendous amounts of natural gas. In 2014, Pennsylvania was the second largest supplier of natural gas in the nation, and natural gas operators reported increased production rates. In 2014, more than 4 trillion cubic feet of natural gas were produced in Pennsylvania.

Unconventional Gas Production

(Mcf = 1,000 cubic feet)



The following table identifies the Top 25 producers of natural gas in Pennsylvania during the 2014 calendar year, based on production data reported to DEP.

Oil and Gas Operator	Gas Quantity (in 1,000 cu.ft.)
CHESAPEAKE APPALACHIA LLC	788,211,065
CABOT OIL & GAS CORP	562,652,793
RANGE RESOURCES APPALACHIA LLC	310,602,130
SOUTHWESTERN ENERGY PROD CO	294,809,228
EQT PRODUCTION CO	282,932,244
ANADARKO E&P ONSHORE LLC	205,417,123
CHIEF OIL & GAS LLC	197,260,387
TALISMAN ENERGY USA INC	185,683,259
SENECA RESOURCES CORP	158,066,028
CHEVRON APPALACHIA LLC	135,041,089
CNX GAS CO LLC	120,617,923
SWEPI LP	116,463,105
RICE DRILLING B LLC	79,710,274
CARRIZO (MARCELLUS) LLC	69,407,477
PA GEN ENERGY CO LLC	68,608,276
XTO ENERGY INC	61,937,511
EXCO RESOURCES PA LLC	60,334,176
WPX ENERGY APPALACHIA LLC	47,469,615
ALPHA SHALE RES LP	44,792,686
RE GAS DEV LLC	43,322,298
ENERGY CORP OF AMER	27,093,193
ATLAS RESOURCES LLC	26,587,377
CITRUS ENERGY CORP	24,143,103
WARREN E & P INC	23,767,017
NOBLE ENERGY INC	22,257,182

A technical analysis of gas production trends was conducted by staff in DEP's Bureau of Planning and Program Management that resulted in the publication of a poster presentation. The poster publication titled "Using Gas Production and Produced Water Trends to Explore Marcellus Formation Development in Pennsylvania" can be viewed on DEP's website here.

PERMITTING:

The Office of Oil and Gas Management is responsible for the review of all permit authorizations related to the construction of oil and gas wells and development of the sites on which they are constructed. Although there are many types of permit authorizations that are issued by permitting staff within the Office of Oil and Gas Management, those most commonly issued by DEP include the "Erosion and Sediment Control General Permit", individual and various general permits for stream crossings and encroachments and the "Drill and Operate a Well" permit (commonly called the Well Drilling Permit). The Office of Oil and Gas Management also operates a well plugging program that requires entities that intend to plug an orphaned or abandoned well to submit formal notice to DEP.

Erosion and Sediment Control General Permit-2

The Erosion and Sediment Control General Permit-2 (ESCGP-2) is designed to address earth disturbances at oil and gas sites where more than 5 acres of land are disturbed. This general permit is typically used to authorize an operator to construct unconventional gas well pads and associated pipelines.

The standard permit review timeframe for an ESCGP-2 permit is 43 business days. DEP offers an expedited review process whereby a permit decision can be reached in 14 business days provided the project achieves specific permit standards and ensures protection of the environment. In certain situations, such as when a well site is in close proximity to high quality or exceptional value waters, the expedited review process is not available to the permit applicant.

In 2014, DEP issued 250 standard ESCGP-2 permits and 474 expedited ESCGP-2 permits. Since 2013 was the first year that the ESCGP-2 permit was created and in use, the department continues to evaluate the long-term permit trends for these types of permits.

Individual and General Permits for Stream Crossings and Encroachments

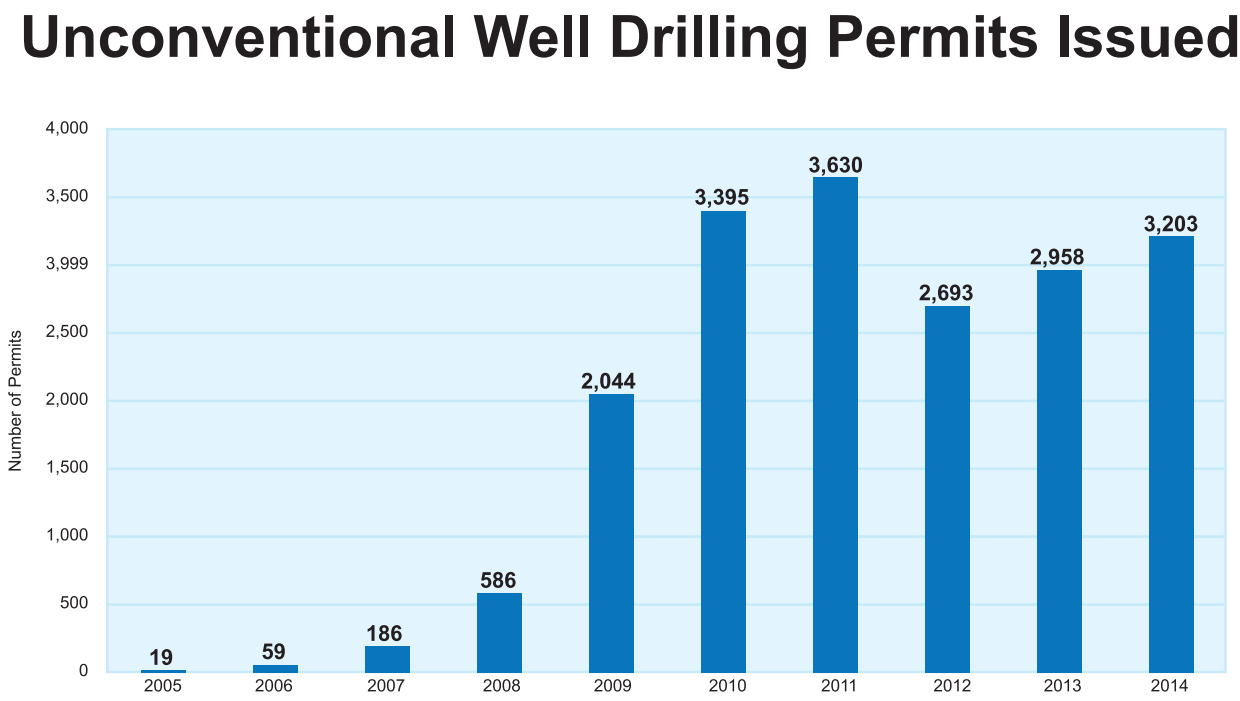
Traditionally, DEP's Office of Water Management is responsible for the oversight of the Department's permitting program as it relates to stream crossings and encroachments that are regulated by Chapter 105 of Pennsylvania's water obstructions and encroachments regulations. In the case of pipelines, bridges and other structures associated with oil and gas activities that cross or encroach on waters of the Commonwealth, DEP's Office of Oil and Gas Management has been delegated responsibility to review and issue such permits. Depending on the nature of the stream crossing or encroachment, an oil and gas operator must either obtain an individual permit or authorization under one of several types of general permits that have been established for similar types of projects. In some cases, the U.S. Army Corps of Engineers also reviews the same encroachment permits where it maintains authority. In 2014, DEP's oil and gas program issued approximately 100 individual permits and approximately 800 general permit authorizations for stream crossings and encroachment activities.

Drill and Operate a Well Permit

As the name implies, the Drill and Operate a Well Permit authorizes an operator to construct and operate a conventional or unconventional well. An unconventional well site and well pad is typically constructed to accommodate multiple wells. An operator must obtain an individual permit for each well that is constructed. A Drill and Operate a Well Permit must be submitted to DEP for each additional well that is intended to be drilled on the well pad or when an existing well is drilled deeper into the geologic formation. The Oil and Gas Act requires DEP to render a permit decision within 45 calendar days of receiving a complete application.

2014 Permit Trends

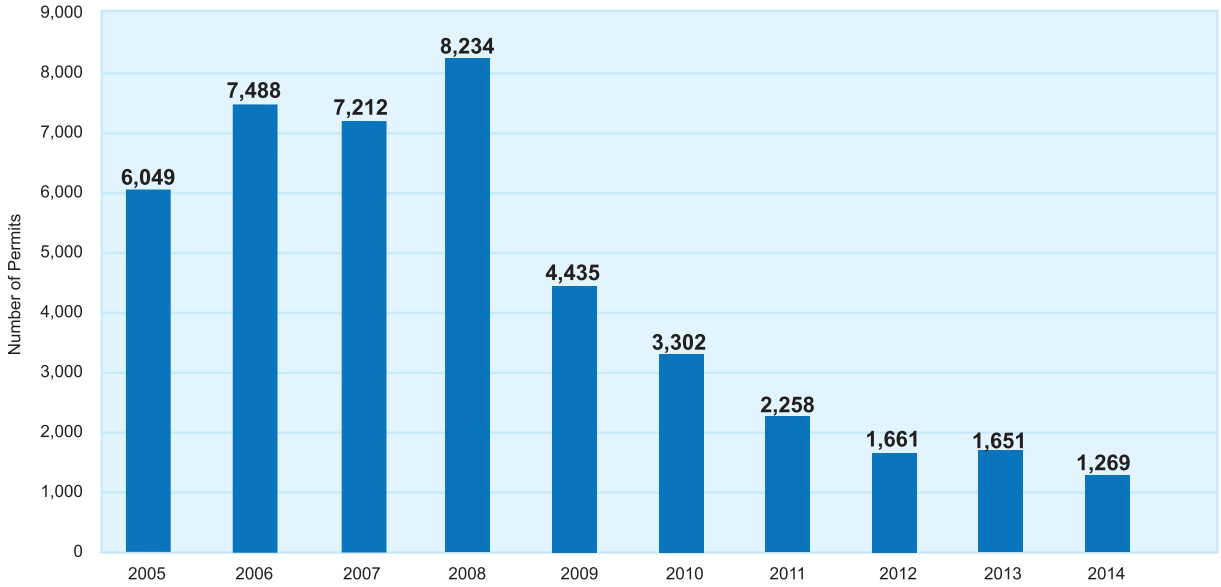
In 2014, DEP issued a total of 4,472 well drilling permits including both conventional and unconventional wells in Pennsylvania. Of this amount, DEP issued 3,203 well drilling permits for the construction of unconventional wells and 1,269 well drilling permits for the construction of conventional wells. The graph below shows the total number of unconventional well drilling permits issued by DEP since 2005.



Since 2012, the number of unconventional well drilling permits issued by DEP has been trending upward, though levels have not reached the highest peak that occurred in 2011. It is expected that the number of unconventional drilling permits submitted to the Department in 2015 will decrease due to national and international "supply and demand" factors along with individual oil and gas business strategies and practices.

Since 2008, conventional oil and gas well development has been trending steadily downward as seen in the following graph:

Conventional Well Drilling Permits Issued



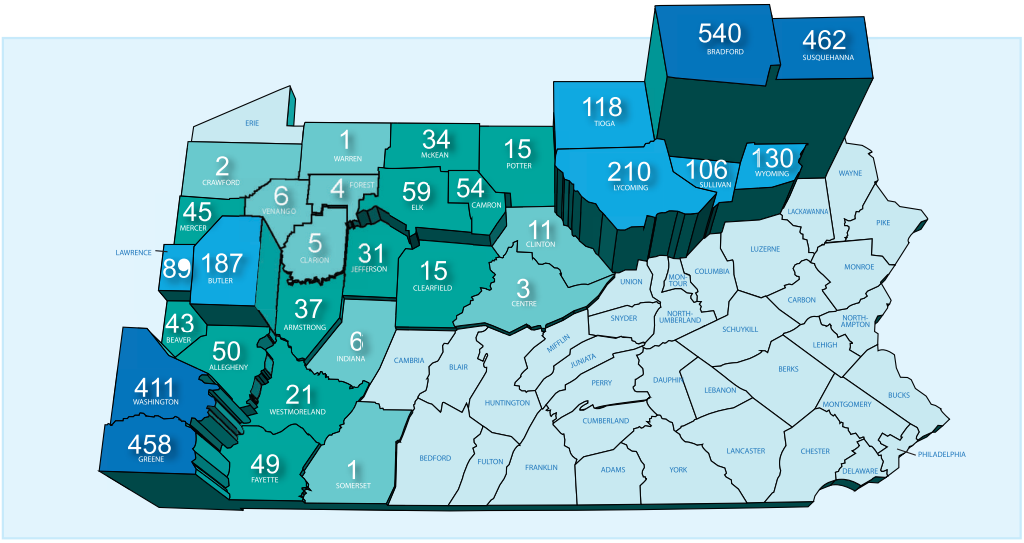
Distribution of Well Drilling Permits Issued in Pennsylvania

Unconventional Well Drilling Permits

The geographic region of the state where operators have obtained well drilling permits to construct unconventional wells generally correlates to the locations of the unconventional shale plays. However, not all locations within the unconventional shale plays are equal in terms of the volume of available gas or the productivity of the wells that are constructed.

The map below identifies the distribution, by county, of the 3,203 well drilling permits issued in calendar year 2014 for the purpose of constructing unconventional gas wells.

Unconventional Well Drilling Permits Issued



Distribution of unconventional well drilling permits issued (2014).

During 2014, the top ten counties with the highest number of unconventional permits issued by DEP were:

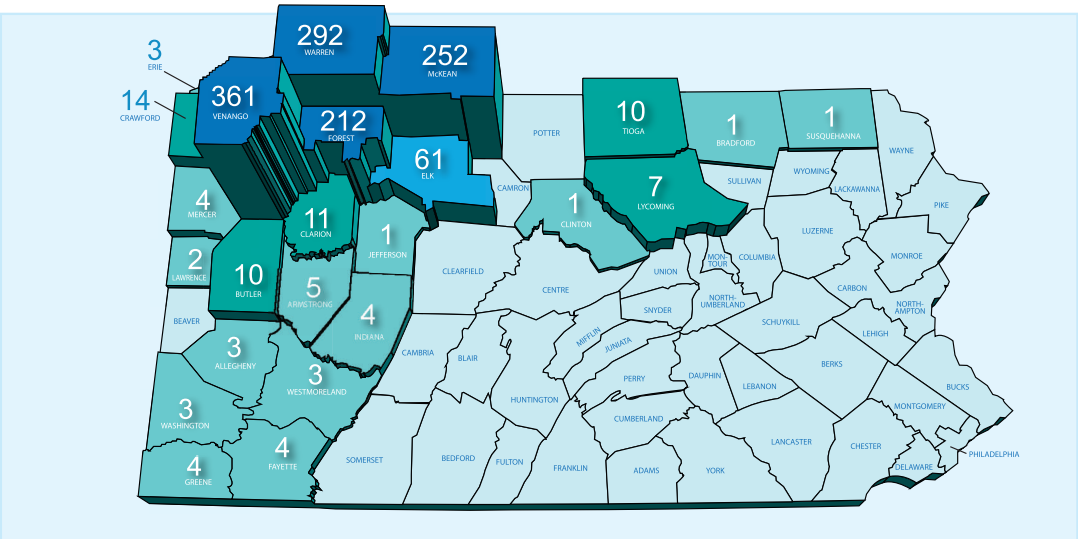
Country	Number of Unconventional Permits issued
Bradford	540
Susquehanna	462
Greene	458
Washington	411
Lycoming	210
Butler	187
Wyoming	130
Tioga	118
Sullivan	106
Lawrence	89

Conventional Well Drilling Permits

The map below identifies the distribution, by county, of the 1,269 well drilling permits issued in calendar year 2014 for the purpose of constructing conventional oil and gas wells.

As evidenced in the map below, the majority of all well drilling permits for conventional well sites were issued to operators in Venango, Warren, McKean and Forest counties. This area is commonly called Pennsylvania's "oil patch" where Pennsylvania Grade crude oil is most prevalent.

Conventional Well Drilling Permits Issued



Distribution of conventional well drilling permits issued (2014).

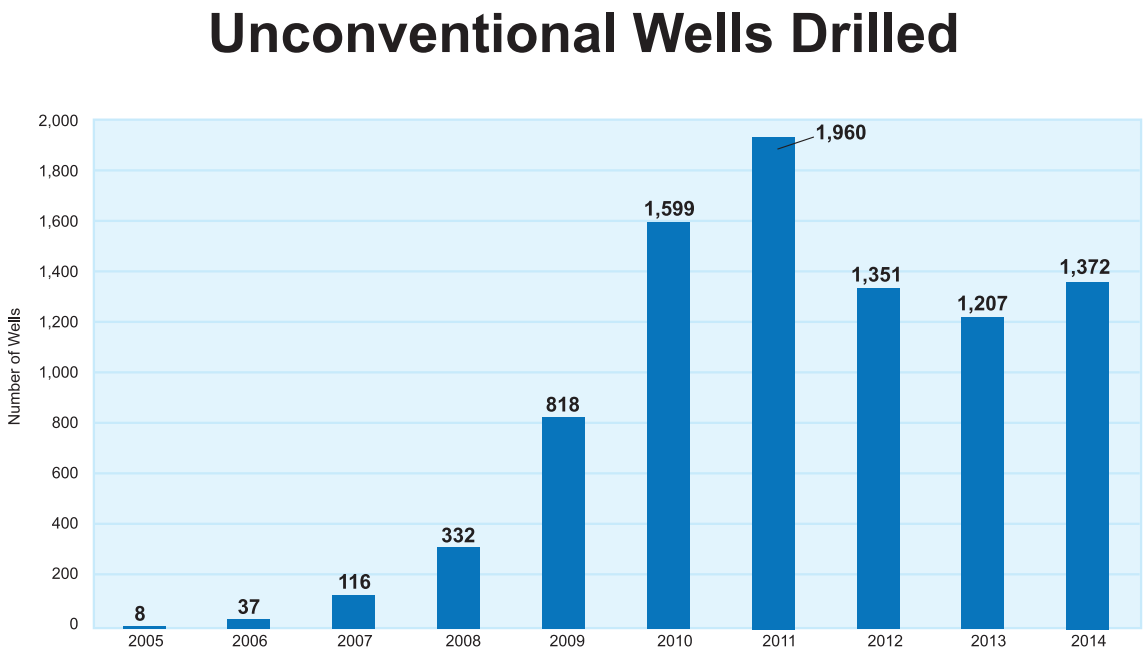
During 2014, the top ten counties with the highest number of conventional permits issued by DEP were:

Country	Number of Conventional Permits issued
Venango	361
Warren	292
McKean	252
Forest	212
Elk	61
Crawford	14
Clarion	11
Tioga	10
Butler	10
Lycoming	7

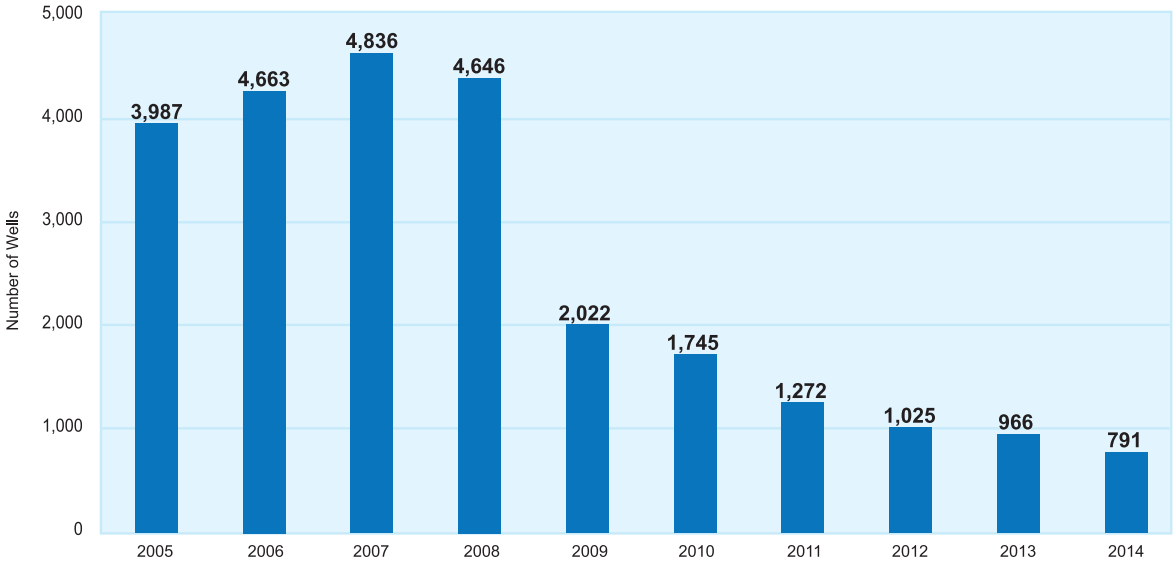
Distribution of Wells Drilled in PA

In 2014, operators drilled a total of 2,163 wells in Pennsylvania, including both conventional and unconventional wells. Of this amount, 1,372 are unconventional wells and 791 are conventional wells.

The actual number of unconventional and conventional wells that are drilled in Pennsylvania varies from the number of well drilling permits that are issued by DEP. One reason for this is that a well drilling permit is valid for a full year and can be extended if requested and approved by DEP. An operator may commence drilling at any time during the period that the permit is in effect. Depending on individual business practices, oil and gas operators may secure a well drilling permit far in advance of commencing actual drilling operations. In some cases, an operator may also determine that a site is not suitable for drilling. Due to these reasons, it is common that the number of permits issued by DEP exceeds the number of wells drilled in any given year.



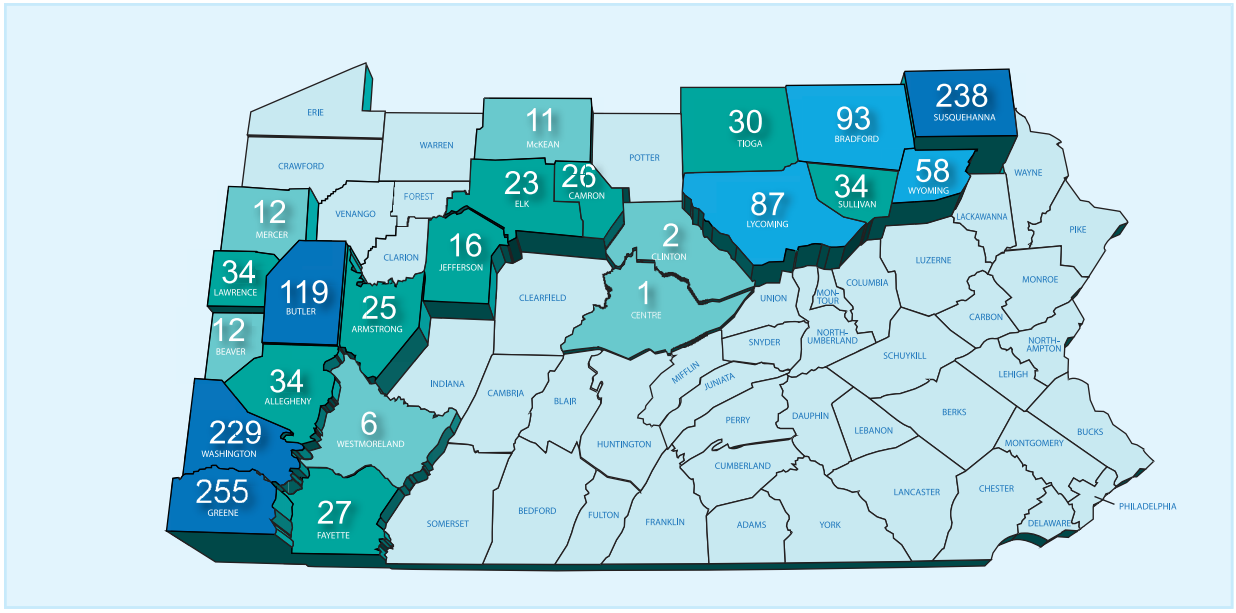
Conventional Wells Drilled



Unconventional Wells Drilled

The following map identifies the distribution, by county, of the 1,372 unconventional wells that were drilled in calendar year 2014.

Unconventional Wells Drilled



Distribution of unconventional wells drilled (2014).

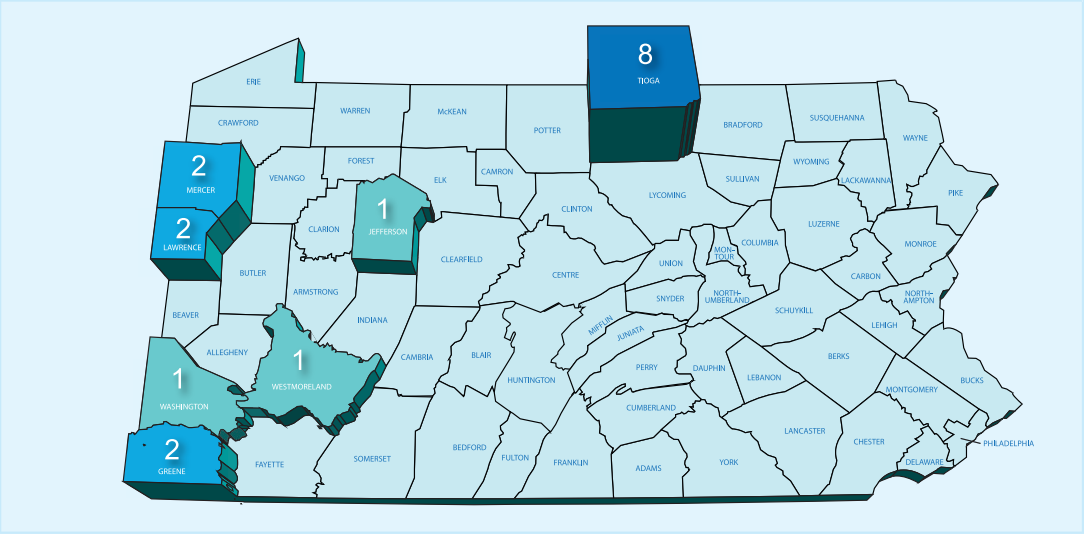
During 2014, the top 10 counties with the highest number of unconventional wells drilled in Pennsylvania include:

Country	Number of ¦ yconventional Wells Drilled
Greene	255
Susquehanna	238
Washington	229
Butler	119
Bradford	93
Lycoming	87
Wyoming	58
Lawrence	34
Sullivan	34
Allegheny	34

Utica Wells Drilled

Of the 1,372 unconventional wells that were drilled in 2014, only seventeen of these wells were drilled into the Utica shale play. The Utica Shale Play lies much deeper below the surface than the Marcellus Shale Play, but also holds significant volumes of natural gas available for future production. It is likely that as market forces stabilize, there will be increased interest in drilling wells into the Utica shale formation. The map below depicts the unconventional wells that were drilled into the Utica shale formation during 2014.

Utica Wells Drilled

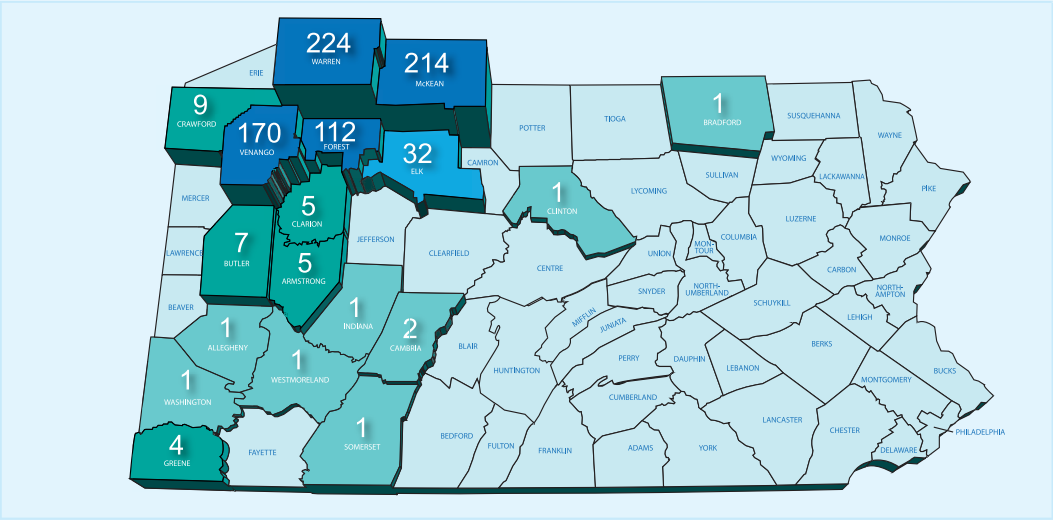


Distribution of wells drilled into Utica shale formation (2014).

Conventional Wells Drilled

The following map identifies the distribution, by county, of the 791 conventional wells that were drilled in calendar year 2014. Of all conventional wells drilled in Pennsylvania in 2014, more than 91 percent were drilled in only four northwestern counties located in the “oil patch” region of the state.

Conventional Wells Drilled



Distribution of conventional wells drilled (2014).

During 2014, the top 10 counties with the highest number of conventional wells drilled in Pennsylvania were:

Country	Number of Conventional Wells Drilled
Warren	224
McKean	214
Venango	170
Forest	112
Elk	32
Crawford	9
Butler	7
Clarion	5
Armstrong	5
Greene	4

WELL PLUGGING PROGRAM:

It is estimated that more than 350,000 wells have been drilled in Pennsylvania, since drilling began over a century ago. Some wells that are drilled produce oil and gas for many years while others do not produce enough oil or gas to be profitable over the long term. When a well ceases to produce oil or gas, it must be properly plugged.

Although stringent requirements currently exist regarding the proper methods to plug wells, this was not always the case. In fact, it was not until the passage of the Oil and Gas Act of 1984 that laws and regulations were created to ensure the safe plugging of orphaned and abandoned wells. Today, Pennsylvania's oil and gas laws and regulations require wells to be properly plugged when they are no longer able to serve their intended purpose. Also, operators are now required to post bonds with DEP to ensure that wells are properly plugged at the end of their useful life.

DEP tracks all known orphaned and abandoned wells; however, many thousands of wells continue to exist and their exact locations may not be known. Currently, there are more than 8,270 orphaned and abandoned wells that are known to exist and are on record with DEP. To date, the department's Well Plugging Program has overseen the plugging of a total of 3,002 wells.

When a responsible owner is known to exist or is identified, the owner is legally responsible to plug a well when it is no longer capable of producing oil or gas. When orphaned and abandoned wells are discovered and no responsible owner exists, those wells are placed on the department's list of orphaned and abandoned wells. DEP inspects and evaluates each newly discovered orphaned and abandoned well, and then ranks and prioritizes those wells for future plugging. Prioritization is based on health and safety criteria, environmental degradation and other potential impacts. Wells that present a high risk to human health and safety and the environment are plugged first. DEP inspectors routinely follow up to ensure that all wells are plugged in accordance with DEP's regulatory requirements.

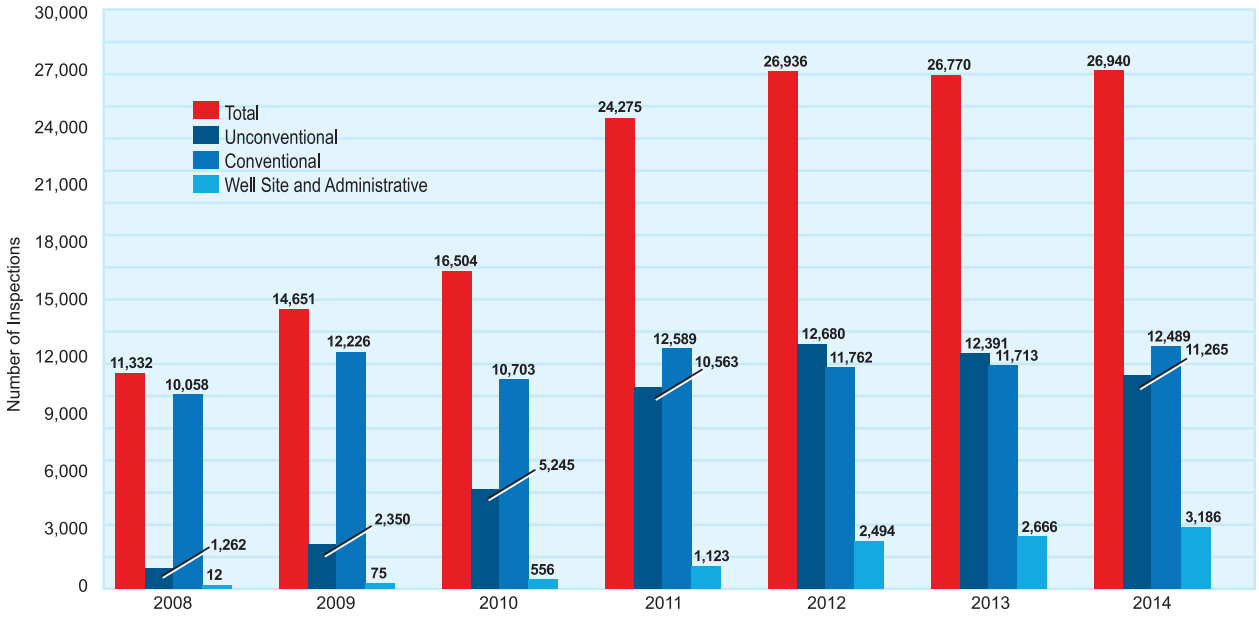
Funding for the Orphan and Abandoned Well Plugging Program is derived from surcharges established by Section 3271 of the 2012 Oil and Gas Act. Well plugging contracts are funded by permit surcharges that are collected in addition to the well drilling permit application fee. The orphan well surcharge is $100 for an oil well or $200 for a natural gas well. A separate additional abandoned well surcharge of $50 applies to both oil and gas wells. The Orphan Well Plugging Fund and the Abandoned Well Plugging Fund are dependent on the number of new drilling permits submitted to DEP by oil and gas operators. In addition to these fees, the Oil and Gas Act of 2012 allocated funding to the Commonwealth Financing Authority for the purpose of administering a grant program that includes well plugging.

INSPECTIONS:

DEP's Office of Oil and Gas Management conducts rigorous inspections at oil and gas sites across the state. Inspections at well sites are necessary to ensure that the environment is protected, particularly during well development. In response to enhanced oversight and in conjunction with the notification requirements contained in the 2012 Oil and Gas Act, the Office of Oil and Gas Management has increased the number of inspections conducted at conventional and unconventional well sites. Likewise, DEP has increased the number of its inspectors since 2009 to its current level of 100 inspectors.

As depicted in the bar chart on the following page, the total number of all well inspections has steadily increased from 2008 through 2012; and remained steady through 2014.

Compliance Inspections



COMPLIANCE AND ENFORCEMENT:

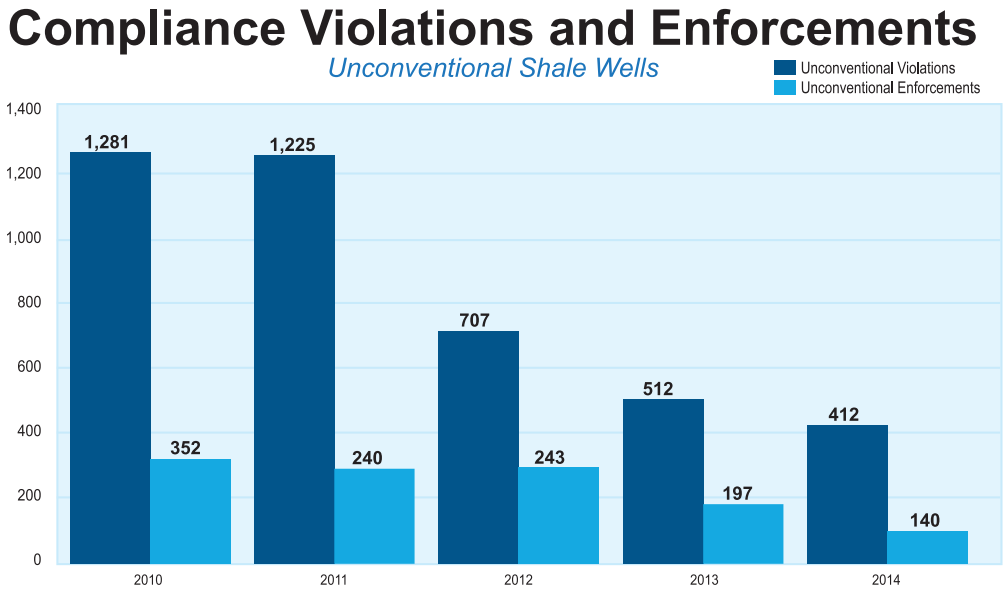
When an individual or company violates a state or federal law or regulation it is considered a "violation". Violations range in the level of severity from minor record-keeping discrepancies to significant incidents that can result in severe environmental harm and/or impacts to human health. An "enforcement action" is an action taken by the department to bring an individual or company into compliance or to assess a fine or penalty for having operated in violation of the law or regulation. In cases of minor violations or when an operator takes immediate action to correct the violation, the department may issue a Notice of Violation. When the department observes significant violations or when an operator does not correct the violation in a timely manner, the department may choose to pursue additional enforcement actions such as orders, civil penalties and criminal penalties.

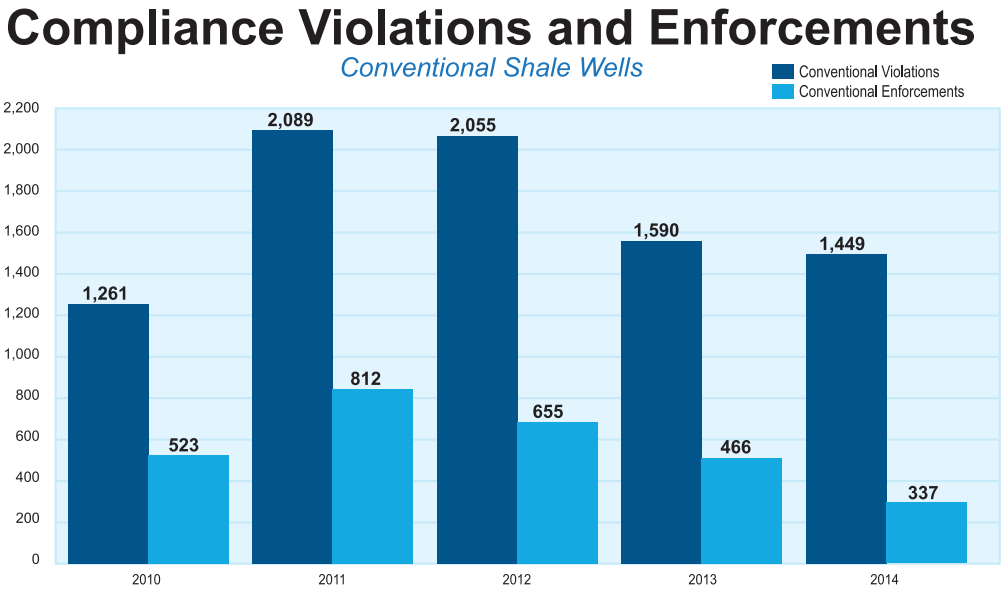
The ultimate goal of the department is to ensure that all companies operate in compliance with environmental laws and regulations. In many cases, operators demonstrate compliance with the law or come into compliance voluntarily when a violation is observed. In such cases, it may not be necessary for the department to pursue an enforcement action in order to elicit compliance. Therefore, not all violations result in enforcement actions beyond issuance of a Notice of Violation. The department has increased its efforts over the past several years to ensure improved regional consistency and continuous improvement in its compliance and enforcement programs that are administered by DEP's district oil and gas offices. During 2014, DEP focused its efforts on updating its compliance and enforcement policy titled "Standards and Guidelines for Identifying, Tracking and Resolving Oil and Gas Violations." The department published this policy in the *Pennsylvania Bulletin* on October 4, 2014 and the public was provided 45 days to provide public comment. DEP responded to all comments and published the final policy in January 2015.To view this policy, click here.

Compliance Trends

Although the number of inspections has increased since 2008, the number of violations as a result of DEP's inspection efforts has been steadily decreasing. The record suggests that DEP's compliance initiatives and outreach to operators are working as compliance rates are improving.

The following graphs compare the number of violations that were identified at unconventional and conventional shale well sites to the number of enforcement actions that were assessed by the department against oil or gas operators. The number of violations observed at conventional and unconventional oil and gas well sites has been decreasing throughout Pennsylvania since 2011. In 2014, 1,449 violations were identified at conventional well sites, and 412 violations were observed at unconventional well sites. DEP is committed to vigorously pursuing enforcement actions as warranted and to encouraging operators to come into compliance with environmental laws and regulations.





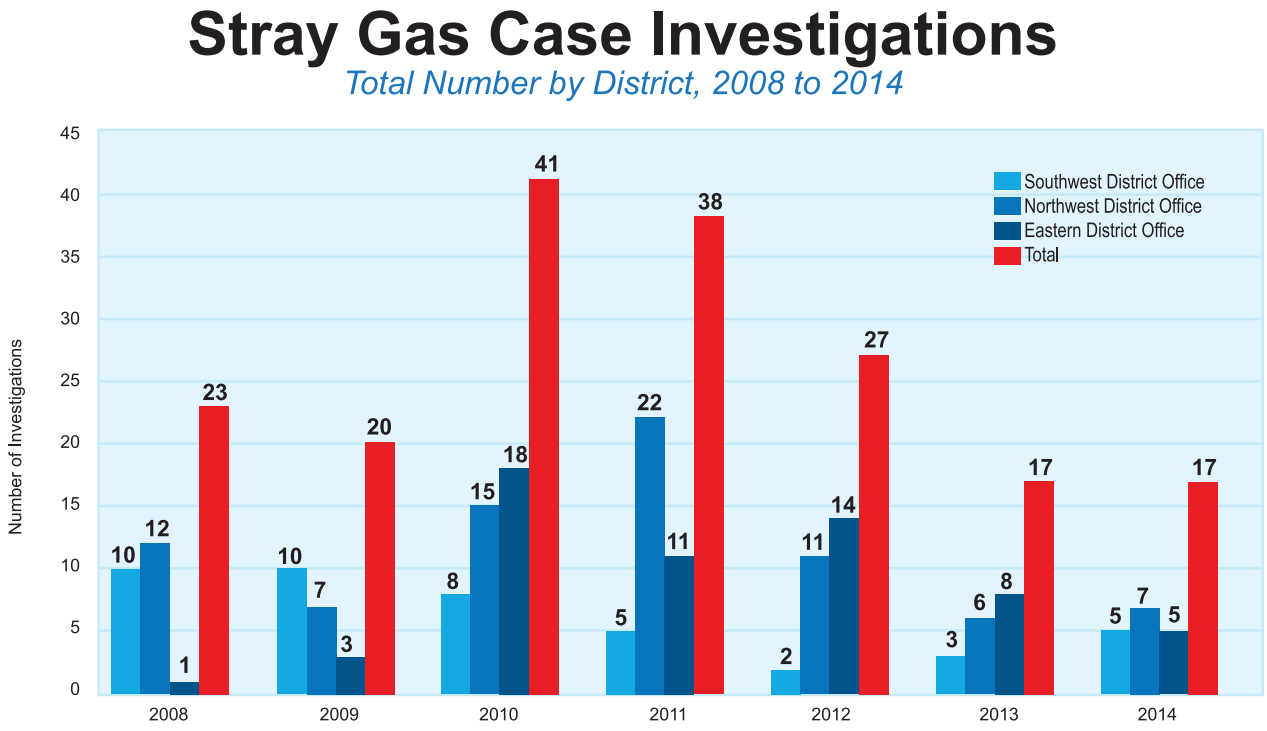
STRAY GAS INVESTIGATIONS:

One of the most important issues associated with oil and gas exploration and development is the effective engineering and construction of oil and gas wells. If wells are not constructed or operated properly, there is a potential risk for natural gas to escape from the well bore and into subsurface geologic strata or groundwater sources. If this happens, it is called “stray gas” migration and the responsible operator is required by law to correct or mitigate the situation.

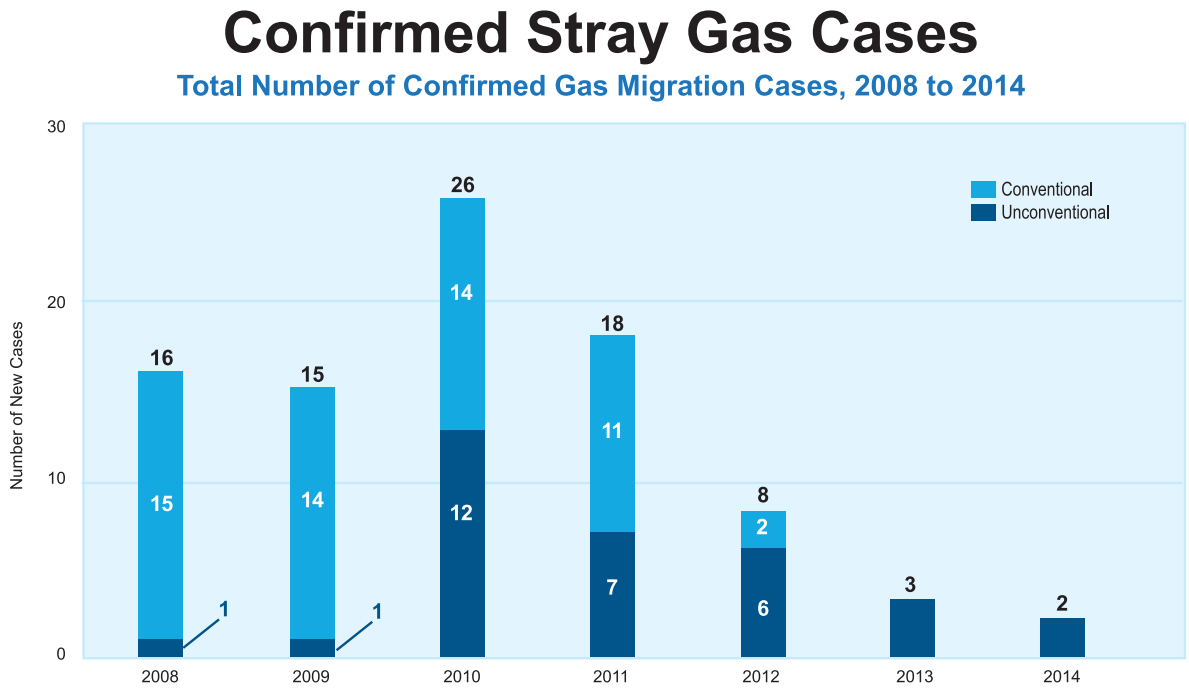
DEP's Office of Oil and Gas Management responds to stray gas complaints and conducts investigations to determine the source of gas when it occurs. The Department has the ability to conduct extensive three-dimensional modeling to visualize the site and determine the nature and source of methane contamination. In 2014, DEP staff developed a technical poster titled “Application of 3D Modeling to Differentiate Naturally Occurring Methane and Methane Migration Associated with Natural Gas Development” that can be viewed here. (Editor's note – This poster was developed using Adobe software and may take a few moments to download.)

DEP also co-authored a water resources report in 2014 with the Pennsylvania Department of Conservation and Natural Resources' Geological Survey titled “W71: Groundwater and petroleum resources of Sullivan County, Pennsylvania.” The report discusses mechanisms contributing to stray gas migration in detail and can be accessed here.

The following graph identifies the number of stray gas investigations conducted by DEP from 2008 through 2014.



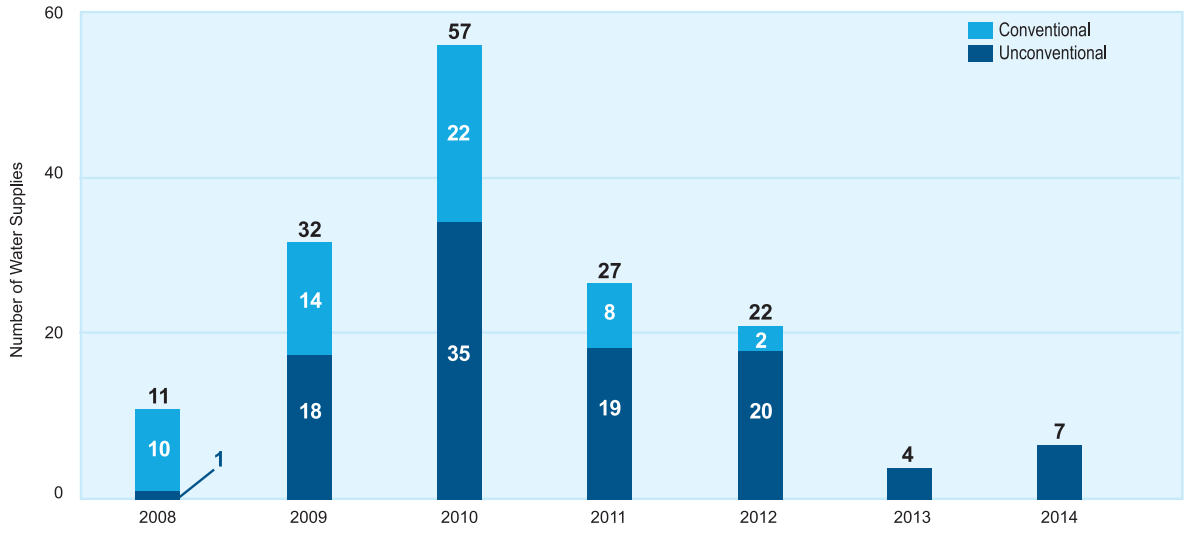
The following bar chart identifies the number of confirmed positive determinations from 2008 through 2014 for gas migration cases investigated by DEP. If a stray gas investigation does not result in a confirmed positive determination, then it is not included in this bar graph. If a stray gas investigation extends from one calendar year into a future calendar year, the confirmed positive determination is reported in the year in which the investigation was initiated.



The Pennsylvania Oil and Gas Regulation at 25 Pa. Code, Chapter 78, Subchapter D provides specific requirements for the construction of oil and gas wells including, but not limited to, casing and cementing practices. It also details requirements that operators must fulfill when a potential gas migration incident has occurred. The department updated these subsurface activities regulations to strengthen well construction practices that are required of operators and place many of the responsibilities of investigating stray gas incidents on the oil and gas industry. The revised rulemaking went into effect on Feb. 5, 2011. The department intends to further improve these subsurface activity regulations through a subsequent rulemaking package that it plans to initiate in 2015.

Impacted Water Supplies

Related to Confirmed Gas Migration Cases, 2008 to 2014



The bar chart above identifies the number of drinking water supplies impacted by confirmed gas migration events. It is not uncommon for a single confirmed gas migration case to affect multiple water sources.

The Oil and Gas Act of 2012 presumes that an operator of an unconventional well is responsible for pollution of a water supply when the source is located within 2,500 feet of the unconventional well and when the pollution occurred within 12 months of the drilling, altering, stimulation or completion of the unconventional well. For conventional wells, an operator is presumed responsible for pollution of a water supply when the source is located within 1,000 feet of the conventional well and when the pollution occurred within 6 months of drilling or altering the well. Unless the operator can successfully demonstrate that the pollution was not caused by its actions based on specific statutory defenses, the operator must restore or replace the affected water supply with an alternate water source.

REGULATORY AND POLICY DEVELOPMENT:

Regulatory Revisions for Surface Activities

DEP's Oil and Gas program began developing a rulemaking to amend the existing oil and gas regulations (25 Pa. Code, Chapter 78, Subchapter C) in April 2011 to specifically address surface-related activities at well sites in Pennsylvania. In particular, these regulations outline the requirements for protecting public resources, waste management at well sites, spill reporting and cleanup, site restoration, pipelines, horizontal directional drilling, water management plans and the road spreading of brine from conventional well sites. This rulemaking also serves to codify environmental provisions mandated by the 2012 Oil and Gas Act.

DEP conducted extensive public outreach on the proposal, which reflects significant input from non-governmental organizations, local government groups, interested citizens and industry representatives.

On August 27, 2013, the Environmental Quality Board (EQB) adopted the proposal for a 60-day public comment period and seven public hearings throughout each of the regions of Pennsylvania. To encourage a greater level of public participation, DEP and EQB extended the public comment period by an additional 30 days and added two hearings bringing the total number of hearings to nine. The public comment period opened on December 14, 2013 and closed on March 14, 2014. Verbal testimony was provided by 290 commentators at the public hearings and more than 24,000 written comments were received.

As a result of the passage of Act 126 of 2014 on July 10, 2014, all regulations under 58 Pa.C.S. (relating to oil and gas) were required to differentiate between conventional oil and gas wells and unconventional gas wells. DEP determined that the Subchapter C rulemaking process would continue, but that the regulations would be completely bifurcated on final rulemaking. The regulatory provisions applicable to conventional wells will be retained in the existing Chapter 78 and a new regulatory Chapter 78a will be created that is applicable to unconventional wells.

On September 25, 2014 DEP presented the two individual chapters of the bifurcated proposed rulemaking to the members of the Oil and Gas Technical Advisory Board (TAB) and discussed the pertinent aspects of the proposed rulemaking. To provide a greater opportunity for public participation, this TAB meeting was conducted via a webinar.

The bifurcated rulemaking represents a first step toward placing the proposed regulatory language into a form that can be further adjusted to address public comments. DEP used the Advanced Notice of Final Rulemaking process to take additional public comment on the draft changes and will advance this rulemaking through the final regulatory process during 2015. This rulemaking must be delivered to the Independent Regulatory Review Commission (IRRC) by March 14, 2016 or it is deemed withdrawn.

Regulatory Revisions for Unconventional Well Permit Fees

As required by the Oil and Gas regulations, DEP prepared a three-year report on its fee structure and developed a proposed rulemaking to address the disparity between program income and program costs. This rulemaking amended the existing oil and gas regulations (25 Pa. Code, Chapter 78, Subchapter B) to modify the unconventional natural gas well permit fee structure from a sliding fee schedule based on well bore length to a fixed fee of $5,000 for horizontal unconventional wells and $4,200 for vertical unconventional wells. The permit fee structure for conventional wells remains unchanged.

The proposed rulemaking was presented to the Oil and Gas Technical Advisory Board at its April 23, 2013 meeting. The proposed rulemaking package was adopted by the EQB on July 16, 2013 and the board voted to proceed with publication for a 30-day public comment period. The proposed rulemaking was published in the *Pennsylvania Bulletin* on Sept. 14, 2013 and the public comment period closed on Oct. 15, 2013. The department received comments from six commentators and prepared a Comment and Response Document. On Jan. 21, 2014, EQB adopted the final rulemaking and IRRC approved this final rulemaking at its public meeting on May 1, 2014. The final rulemaking was published as final in the *Pennsylvania Bulletin* and the new permit fees became effective on June 14, 2014.

NOTABLE ACCOMPLISHMENTS:

Comprehensive Oil and Gas Development Radiation Study
Generation of Technologically Enhanced Naturally Occurring Radioactive Material (TENORM) in waste generated by the oil and gas industry has increased in Pennsylvania over the past several years due, in part, to the expansion of unconventional natural gas production.

In January 2013, DEP undertook a study to assess levels of naturally occurring radioactivity in the by-products associated with oil and natural gas development. DEP began studying radioactivity levels in flowback waters, treatment solids and drill cuttings, as well as transportation, storage and disposal of drilling wastes. This effort included a study of radon levels in natural gas to ensure that public health and the environment continue to be protected.

The Department published the TENORM report on January 15, 2015. While the report outlines recommendations for further study, it concluded there is little potential for harm to workers or the public from radiation exposure due to oil and gas development.

The study report was the culmination of a multi-year effort and represents what may be the most comprehensive radiological study of the oil and gas industry ever conducted in Pennsylvania. While the recommendations for future actions contained in the report call for additional studies and efforts, the Department now has data to inform the management of natural gas resources and resultant wastes for environmental and health protection.

In summary, the peer-reviewed study concluded that:

- There is little potential for additional radon exposure to the public due to the use of natural gas extracted from geologic formations located in Pennsylvania.
- There is little or limited potential for radiation exposure to the public and workers from the development, completion, production, transmission, processing, storage, and end use of natural gas.
- There is little potential for radiation exposure to workers and the public at facilities that treat oil and gas wastes.
- There is little potential for radiation exposure to the public and workers from landfills receiving waste from the oil and gas industry.
- While limited potential was found for radiation exposure to people using roads treated with brine from conventional natural gas wells, further study of radiological environmental impacts from the use of brine from the oil and gas industry for dust suppression and road stabilization should be conducted.

  To read the entire report and a complete list of its observations and recommendations, click here.

Mechanical Integrity Assessments (Quarterly Inspections)
When an operator constructs an oil or gas well, it is critical that the well be constructed in a manner that prevents communication between the well bore and fresh groundwater. To ensure well construction materials are functioning as intended over the life of the well, Pennsylvania's Oil and Gas Regulation (25 Pa. Code, Chapter 78, Section 78.88) includes requirements for regular inspections of the well components accessible at the surface. Specifically, operators are required to conduct quarterly inspections to ensure all operating wells are in compliance with well construction and operating standards described in the regulations. If a well is not in compliance, the responsible operator is required to notify DEP and take corrective actions to repair or replace defective equipment or mitigate any excess pressure on the surface casing through which gas is being produced.

The quarterly inspection program began in the fourth quarter of 2013. The first annual inspection report, consisting of quarterly inspection data for the 2014 calendar year, was submitted by conventional an unconventional operators to the department on February 15, 2015. The department will publish its analysis of the inspection data in mid-2015.

Mechanical Integrity Assessment - Narrated Tutorials
To assist the regulated community in understanding how to conduct and document quarterly mechanical integrity assessments, DEP developed thirteen separate narrated tutorials that explain what is required. One of the tutorials is specifically designed to address assessments that pertain to “home use” wells that are intended to provide natural gas to a single location such as an individual residence rather than a commercial well that supplies natural gas to the public market place. These video tutorials are available to the public on DEP's website along with PowerPoint presentations here.

Interactive Oil and Gas GIS Map
On Dec. 19, 2013 DEP announced the release of a new online Oil and Gas Well Mapping Tool that provides convenient access to statewide well data. This tool serves as a one-stop-shop in making information about permitted wells available to the public on a graphical platform. This represented the first step in a process of linking all associated information regarding individual oil and gas wells such as well records, completion reports and well plat information in a user-friendly GIS format.

In October 2014, the Office of Oil and Gas Management added inspection, violation, and enforcement data for oil and gas wells and well sites to this map tool. The public can use this application to find a specific well by permit number, or multiple wells based upon various criteria. The mapping tool enables the public to identify various attributes of that well, including well name, operator, well type, well status, permit date, date that drilling commenced, production data, and inspection, violation and enforcement data.

Upon selecting inspection data, users are presented with a list of well site and well inspections that have been conducted by the department, along with inspection date, inspection results, number of violations, and inspection comments. If violations are found, the user can click on the number of violations, and violation information will be presented, including violation date, code, and description, date resolved, resolution reason and violation comment. If one or more enforcement actions are associated with a violation, the user can click on the number of enforcement actions to retrieve detailed information regarding the enforcement action(s), including enforcement type, date executed, date final, final status, and penalty amount, if applicable. This is the latest step in the department's continued effort toward providing the public with a single source to access all well and well site information.

This tool is available here.

e-Well Permitting – Full Launch and Outreach to Regulated Community
In October 2014, DEP launched the e-Well Permit, an electronic version of the Well Drilling Permit that must be obtained by an oil and gas operator before drilling activities can begin. The e-Well Permit streamlined the oil and gas permitting process by converting this DEP paper-based permit to a fully online system that includes an electronic application, electronic review and electronic permit issuance.

DEP's Oil and Gas Program is the first permit program within DEP that has been migrated to an electronic permitting platform. This results in the elimination of paper-based permit applications, reducing processing and physical storage space requirements. This new tool increases efficiency, improves data integrity, and improves DEP's ability to provide timely responses to Right-to-Know requests.

The e-Well permit was developed in-house in partnership with DEP's Bureau of Information Technology. Oil and gas operators utilize a secure web interface where they can create and electronically submit a well permit application with supporting documentation. DEP staff now have the ability to review and route permits more efficiently while seamlessly interacting with the department's enterprise-wide permitting and compliance database called eFACTS (Environment Facility Application Compliance Tracking System).

DEP hosted a public webinar in October 2014 to educate operators about how to access the eWell permit application, create a new permit application, edit a saved application and submit it to the department. The webinar is posted on the DEP website here.

WHAT'S NEXT FOR 2015?

Pipeline Infrastructure Task Force
In the next decade, Pennsylvania can expect to see substantial pipeline infrastructure construction to transport gas and related products from thousands of wells throughout the state. The unprecedented build-out creates an opportunity for DEP to engage stakeholders in a collaborative process to achieve a world-class pipeline infrastructure system that adheres to high standards and reduces or avoids environmental and community impacts.

The Pipeline Infrastructure Task Force will be a multi-agency and external stakeholder-driven effort that will develop policies, guidelines, and tools to assist in pipeline development (including planning, permitting and construction) as well as long-term operation and management protocols. Specifically, the task force will define a series of best practices for: planning, siting and routing pipelines; amplifying and engaging in meaningful public participation; maximizing opportunities for predictable and efficient permitting; employing construction methods that reduce environmental impacts; and developing long-term operations and maintenance plans to ensure pipeline safety and integrity.

This will be a transparent process, and will entail close coordination with federal agencies, state partners, local governments, industry representatives and the public.

Regulatory Revisions for Subsurface Activities
The Oil and Gas Division of Well Plugging and Subsurface Activities intends to advance a proposed rulemaking during 2015 to update Subchapters D, E and H of 25 Pa. Code, Chapter 78.

The rulemaking will include revisions to these subchapters that regulate the drilling, casing, cementing, completion, operation, production and plugging of wells in Pennsylvania as well as other subsurface activities associated with oil and gas exploration and development. Specifically, the regulatory amendments will include revisions to well plugging procedures, coalbed methane development, and well drilling, cementing and hydraulic fracturing procedures. DEP presented a paper outlining the anticipated changes at its June 26, 2014 Technical Advisory Board meeting. The concepts paper is available here.

Water Supply Complaint Tracking System
Currently, DEP tracks general complaints that are received across all programs through an internal Department-wide complaint tracking system. In an effort to capture information that is solely related to complaints from individuals who suspect that their drinking water supply has been affected by oil and gas related activities, DEP plans to develop an oil and gas "Water Supply Complaint Tracking System". This tool will collect a variety of data that is more expansive than the information that is currently collected in the DEP's general complaint tracking system. This tool is expected to be completed during the first quarter of 2016.

As an interim measure, the Office of Oil and Gas Management developed a list of private water well supplies that have been adversely affected by oil and gas activities. DEP made this list available to the public on its website in 2014. This list includes copies of letters that were mailed to each affected water supply owner since 2008 and can be accessed here, by clicking on "Water Supply Determination Letters".

Monthly Production Reporting
The "Unconventional Well Report Act", amended the 2012 Oil and Gas Act to require operators of unconventional wells to submit to DEP natural gas production reports on a monthly basis. Prior to this statutory amendment, operators of unconventional wells were only required to submit a report on resource production to DEP semi-annually.

In accordance with the Unconventional Well Report Act that became effective on March 31, 2014, unconventional well operators were required to report production data for the month of January 2015 by March 31, 2015, and each following monthly report is due 45 days after the end of the month of production.

The actual monthly reporting deadlines for calendar year 2015 are as follows:

2015 Reporting Periods	Due Date
January	March 31, 2015
February	April 14, 2015
March	May 15, 2015
April	June 14, 2015
May	July 15, 2015
June	August 14, 2015
July	September 14, 2015
August	October 15, 2015
September	November 14, 2015
October	December 15, 2015
November	January 14, 2016
December	February 14, 2016

The Unconventional Well Report Act did not affect the frequency of production reporting for operators of conventional wells. Conventional well operators will continue to report their production data on an annual basis. Production data is self-reported to DEP by operators electronically. All production data are available here.

Wastes generated at unconventional well sites must still be reported semi-annually, on February 15 and August 15 each year and conventional operators report this information on an annual basis. This information is available here.

Electronic Well Record Reporting

Pennsylvania's oil and gas regulations require that within 30 days of the end of drilling a well, operators are required to submit a Well Record to DEP. The Well Record includes detailed information about the well such as the type and amount of cement used in the construction of the well, the source, size and depth of various casings used and a driller's log that includes the geologic formations that were encountered during the drilling process.

Currently, operators are required to submit this record to DEP in a paper format; however, the department plans to develop an electronic reporting tool in 2015 that will enable this information to be reported more efficiently and accurately.

Electronic Completion Reporting

Within 30 days after completion of a well (when the well is capable of production), operators are also required to submit a Completion Report to the department. Completion operations include, but are not limited to, perforating activities, notching activities, and/or stimulation activities. Completion operations include both initial activities and any subsequent activities (e.g., re-stimulation of a wellbore).

During 2015, DEP plans to develop an electronic reporting tool that will enable operators to submit completion reports to DEP in an electronic format.

Revision of Policies and Technical Guidance Documents

The Bureau of Oil and Gas Planning and Program Management is committed to updating all policies and technical guidance documents that will be affected by the promulgation of the final Chapter 78 Subchapter C rulemaking. Staff in the Office of Oil and Gas Management will update all related technical guidance documents as necessary to align with the surface activities regulations. Any revised policies or technical guidance will be shared with the appropriate advisory board/committee and published for public review and comment.

Methane Capture

Methane leakage from natural gas production, transmission and distribution represents a source of greenhouse gas emissions as well as a lost economic opportunity. DEP has already taken significant action to reduce methane leakage through leak detection and repair programs, but more can be done. Over the next year, DEP will work with stakeholders to examine the potential for technology or performance-based approaches to further reduce these emissions and consider rulemaking.

"The future of Pennsylvania's oil and gas exploration and production is bright, and together we can ensure that these valuable resources are developed while preserving Pennsylvania's natural environment for this, and future, generations." - Secretary John Quigley