

PIOGA Well Plugging Workshop April 25, 2019

PA Grade Crude Development Advisory
Council's Role and Well Plugging
Discussions



Overview

- ▶ CDAC – Purpose, Duties and Goals
- ▶ Well Plugging – Scope of the Problem
- ▶ Regulations and DEP Policies for Well Plugging Operations
- ▶ Orphan or Abandoned Well Plugging Program and other funding/incentive concepts

PA Grade Crude Development Advisory Council (CDAC)

- ▶ Established by the Pennsylvania Grade Crude Development Act (Act 52) of 2016

- ▶ Purpose and Duties:
 - Examine and make recommendations regarding existing technical regulations and policies implemented by the DEP that impact the conventional oil and gas industry

 - Explore the development of a regulatory scheme that provides for environmental oversight and enforcement specifically applicable to the conventional oil and gas industry

 - Review and comment on the formulation and drafting of all technical regulations related to the conventional oil and gas industry

 - Promote the long-term viability of the conventional oil and gas industry

CDAC – Legacy Well/Well Plugging Committee

- ▶ Committee Goals:
 - Identification and prioritization of orphan and abandoned wells
 - Increasing efficiencies associated with plugging projects
 - Realizing that there is not one single magic bullet, it's necessary to improve multiple aspects of well plugging
 - Acknowledging that improvements will benefit all stakeholders (Industry, PADEP, and PA citizens)
 - Investigation of potential sources of funding for plugging orphan and abandoned wells and incentivizing of the plugging and the rehabilitation of wells
 - Exploration of potential new technology, methods and materials

Scope of the Problem

- There are more than 8,000 wells in the DEP Orphan or Abandoned Well database. DEP has the statutory authority to plug these wells.
- There are tens of thousands of producing oil and gas wells that will eventually be candidates for plugging. Increasing efficiencies will assist many operators that are facing significant challenges in the current market and regulatory climate.
- Plugging is expensive for both an underfunded state program as well as for companies within the oil and gas industry

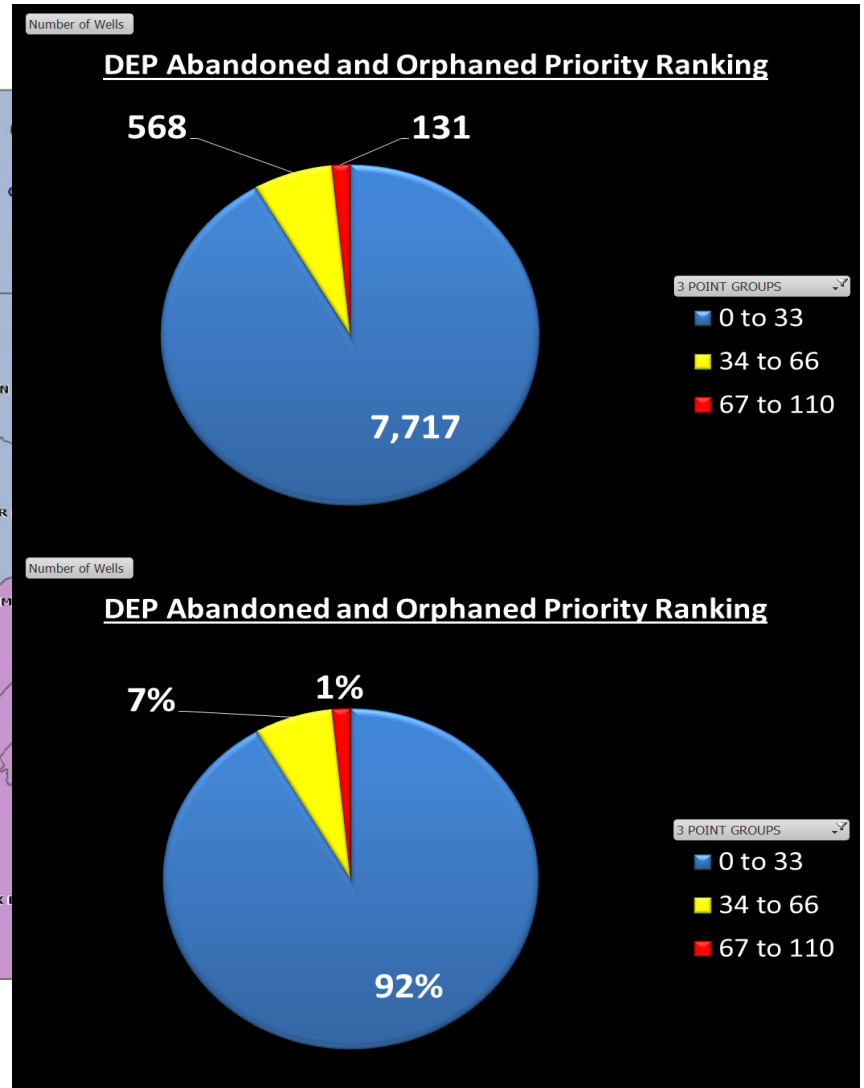
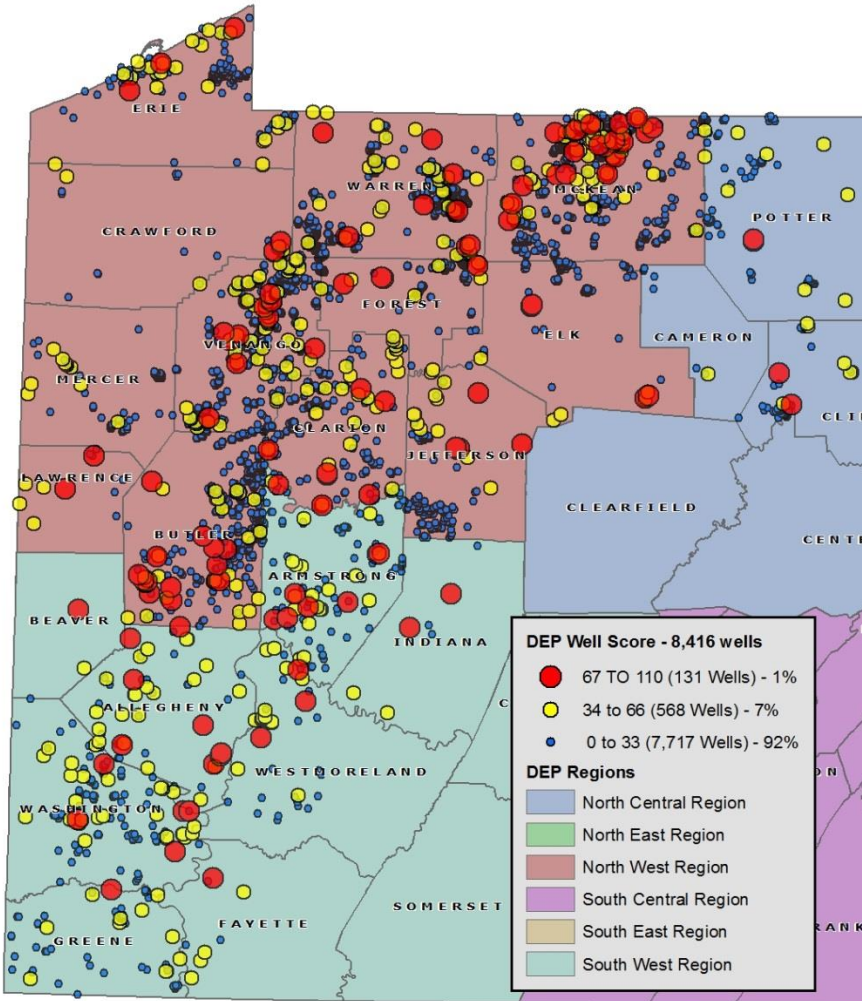
Scope of the Problem

- The environmental regulatory standards associated with well plugging lacks a clear approach to the use of alternative methods and materials
- Lack of incentives for companies who specialize in well plugging to pursue orphan and abandoned well plugging projects
- A flawed perception is that all orphan and abandoned wells present significant safety and environmental risks. A recent industry/agency collaborative analysis of DEP's Orphan and Abandoned Well Database revealed that only a small percentage of wells cause the most significant concerns

A Closer Look at the DEP Orphan or Abandoned Well Database

- ▶ Wells in the DEP database receive scores ranging from 0 to 110 points based on the sum of points from several categories:
 - Safety Hazards – gas in a structure or water supply
 - Environmental Hazards – oil or brine to stream, wetland, water supply
 - Visual assessment
 - Fluid discharges
 - Proximity to occupied buildings
 - Complaints
 - Proximity of well to surface water
 - Ground water affected
 - Presence of workable coal

DEP Orphan and Abandoned Database – 3 Well Groups



Observations

- ▶ Only 1% of identified wells within the DEP Orphan and Abandoned database present a significant threat and should be plugged as soon as possible
- ▶ All plugging candidates could and should be graded and categorized appropriately in an effort to logically allocate finite resources

Well Plugging Workgroup

- ▶ Established in the spring of 2018
- ▶ Consists of representatives of CDAC, OGTAB, Industry and the PADEP
- ▶ Focus: In an effort to maximize well plugging resources, examine and make recommendations regarding existing well plugging technical regulations and policies implemented by the DEP

Well Plugging Workgroup – Areas of Concentration

- ▶ Addressing the discrepancies between the Coal and Gas Resource Coordination Act 214 and Ch. 78.92 and 78.93
- ▶ Well Data Sheet alternative methods concept
- ▶ Method for the reclassification of wells from a coal to a noncoal status prior to plugging
- ▶ FAQ/DEP Policy Document – Requirements for Pulling Uncemented Surface Casing on Pre-Act 223 Wells During Well Plugging
- ▶ Addressing the plugging requirements for untreated formations within cased and open holes
- ▶ Alternate methods and materials
- ▶ Exploring commonsense and properly scaled E&S provisions for well plugging projects

Gas Resource Coordination Act (Act 214) and Chapter 78
Discrepancies: “The gas well shall be plugged in
accordance with the Coal and Gas Resource Coordination
Act (Act 214)”

- ▶ At one time, the Ch. 78.92 and 78.93 regulations for plugging wells in coal areas reflected the language in §13 of Act 214
- ▶ Over the years, the Ch. 78 regulations have been changed, but §13 of Act 214 has not
- ▶ In some cases, the provisions in both documents are similar, but there are many examples of where they are considerably different
- ▶ This disconnect adds a significant layer of confusion to a process that could and should be much simpler
- ▶ **Not only does Ch. 78 need attention, but the laws it references do too**

Act 214 § 13(a)(1) VS Ch. 78.92

Plugging a well in a coal area where the production, surface, and coal protection casings are all cemented in place.

Act 214 § 13(a)(1)	Ch.78.92
“Bottom of the well” is not defined in Act 214	Attainable bottom is defined in Ch. 78
Specifies nonporous material from bottom of the well to 20' above strata	Specifies nonporous material from TD or attainable bottom to 50' below strata
Requires at least a 20' expanding cement plug to be set 20' above each strata w/ nonporous material in between. Expanding cement is not defined in the Act	Cement plugs that extend from 50' below to 100' above strata w/ nonporous material in between plugs. Cement is defined in Ch. 78
Requires wait time on cement	No mention of wait time on cement
Does not mention the retrieval of the uncemented portion of production casing. However, it must be assumed because a later step requires that the coal protection casing to be emptied and another step requires a vent on top of the coal protection casing that will allow access to the full diameter of the coal protection casing. (Impossible if production casing remains in the well)	Requires retrieval of the uncemented portion of production casing

Act 214 § 13(a)(1) VS Ch. 78.92, cont.

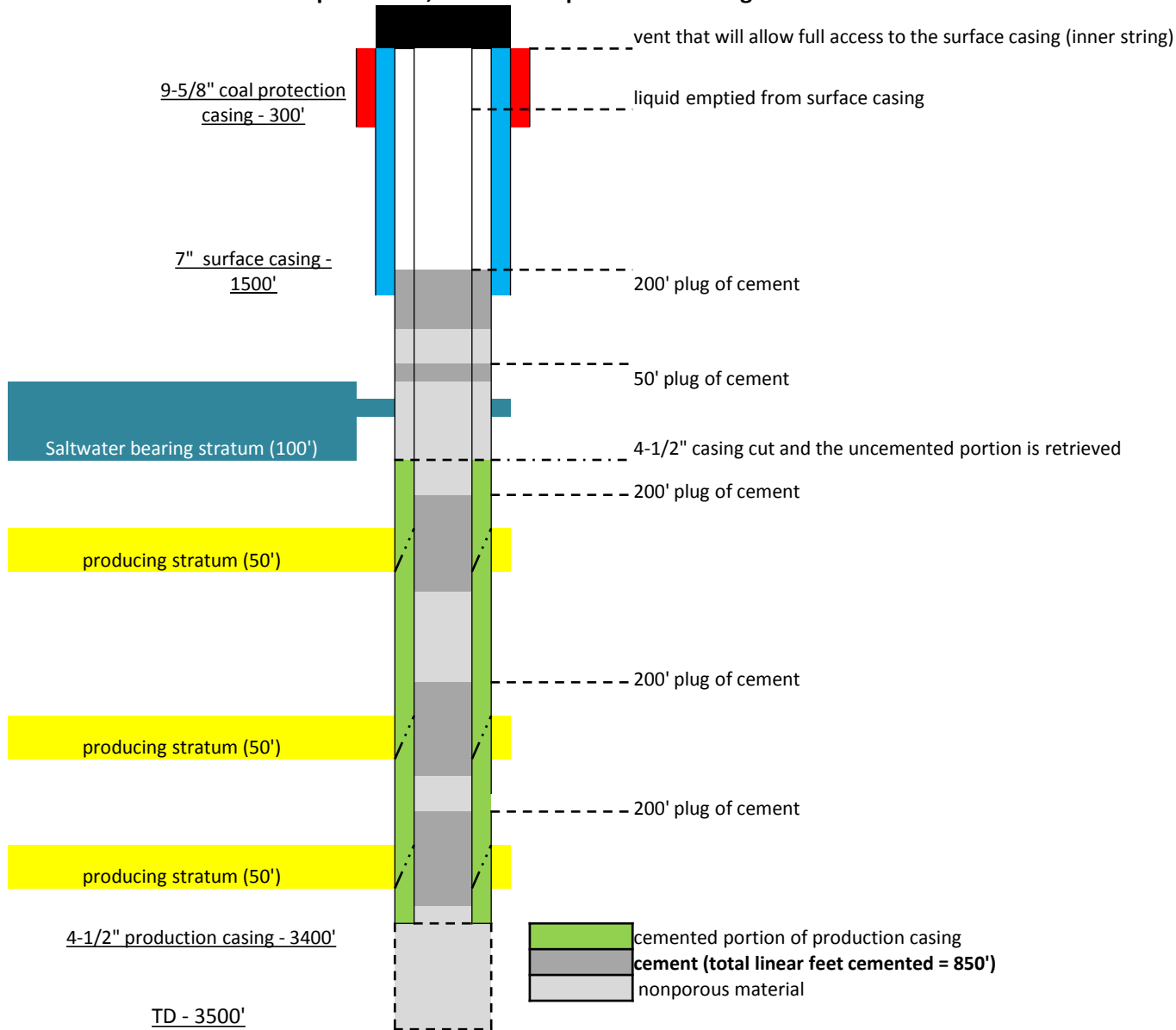
Act 214 § 13(a)(1)	Ch.78.92
Requires at least a 20' cement plug to be set 20' above strata w/ nonporous material in between.	Other stratum above the cemented portion of the production casing to be plugged by filling the hole with nonporous material to 20' above the stratum and set a 50' plug of cement.
Requires a cement plug to be set 10' below the largest casing in the well. Does this refer to surface or intermediate casing set below the coal protective casing? Size of the cement plug is not described in the act.	
Requires the well to be filled with nonporous material to approximately 100' below the bottom of the coal protective casing.	Requires the well to be filled with nonporous material to approximately 100' below the surface casing or coal protective casing, whichever is deeper.
Requires a 100' plug of cement below the coal protective casing.	Requires a 200' plug that extends 100' below to 100' above the surface or coal protective casing seat.
Requires a 72" vent to allow access to the full diameter of the coal protect casing. This is impossible if surface casing or production casing is cemented inside of the coal protection casing.	Requires a 72" vent to be installed on top of the inner string of casing.

Well Name: Type Well 1

Plugging method: Ch. 78.92

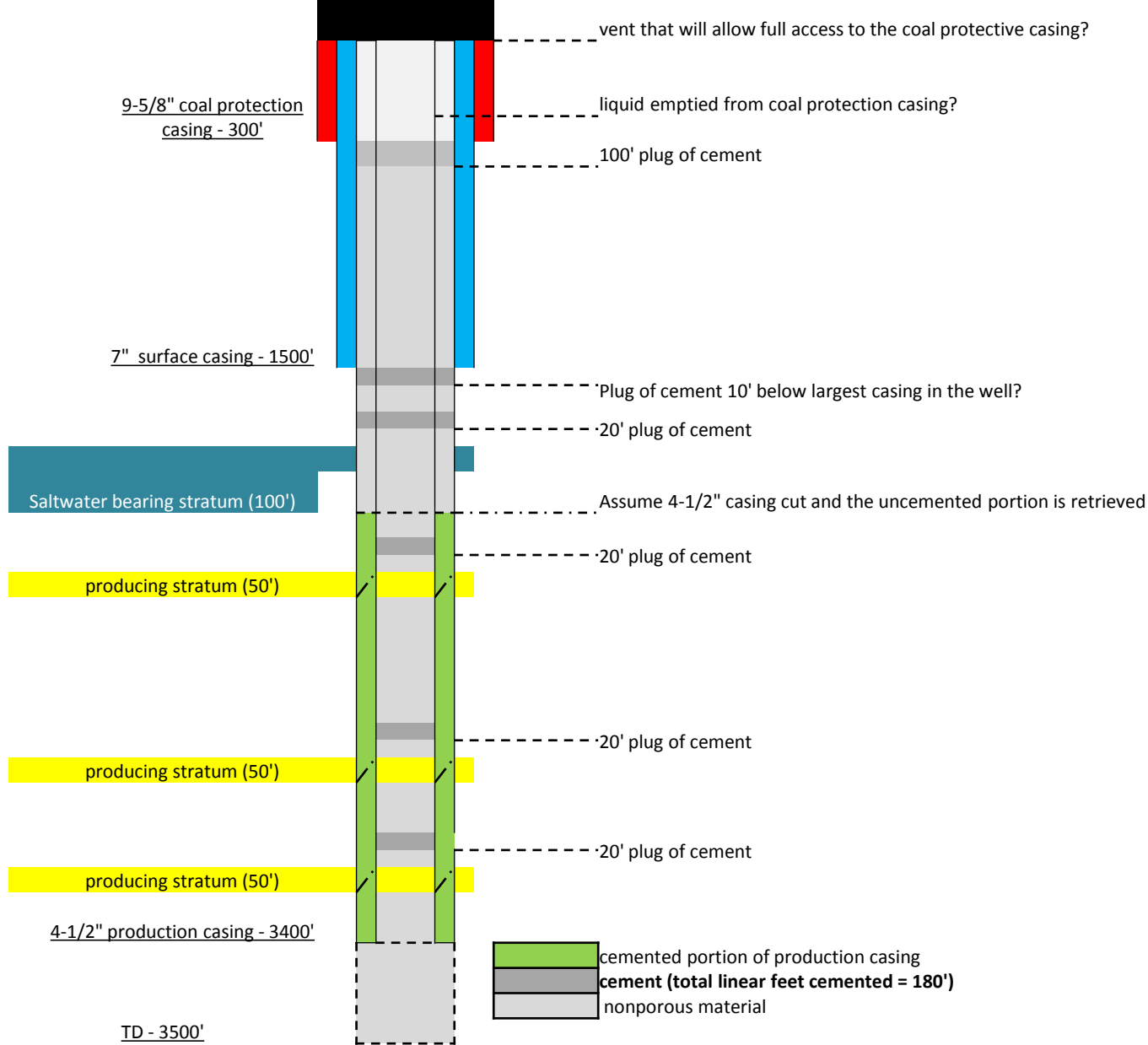
Coal Status: Coal

Well contains cemented coal protection, surface and production casings.



Well Name: Type Well 1
Plugging method: Act 214 § 13(a)(1)
Coal Status: Coal

Well contains cemented coal protection, surface and production casings.



Well Data Sheet Alternatives Methods Concept

- ▶ Intended Uses and Benefits:
 - Operators can voluntarily choose to submit information to the DEP along with the NOI and Alternate Methods and Materials forms
 - The information can demonstrate that the operator possesses the necessary information to make informed decisions when circumstances dictate a modified plan, such as determining an acceptable attainable bottom
 - In advance of mobilizing a plugging operation, the DEP has the opportunity to review the data and provide technical expertise
 - **This practical change would be to give the operator authority to make a determination of attainable bottom during the plugging operation**

Determining Coal Areas and Assignment of Coal Status to a Well

- ▶ Wells located in the DEP southwest region that existed when the Oil and Gas Act of 1984 became law received a coal designation by default. Detailed analysis to determine if the well penetrated a workable coal seam was not performed; thus, many wells are classified as coal although they may not have penetrated a workable coal seam(s) or were drilled in mined-out areas.
- ▶ A workable coal seam is defined as one of the following:
 1. A coal seam in fact being mined in the area in question under the act and this chapter by underground methods.
 2. A coal seam which, in the judgment of the Department, reasonably can be expected to be mined by underground methods.
- ▶ Workable coal seams have been further defined by DEP policy as coal seams that are:
 - a. Laterally extensive seams
 - b. At least 28 inches thick
 - c. And deeper than 100 feet as measured from the land surface

Reclassifying a Well from a Coal Status to a Noncoal Status Prior to Plugging

- ▶ In recent decades, individual wells drilled in coal-bearing regions of PA have been permitted as noncoal wells using site specific information contained in various PA Mineral Resources reports and other credible sources.
 - **M 68: Bituminous Coal Resources in Western PA**
 - M 69: Analyses and measured sections of PA bituminous coals, Part II
 - M 89–94,96,98: Coal Resources of PA – crop lines, mined-out areas, and structure contours
 - Online resources: Pennsylvania Mine Map Atlas
 - Drillers logs associated with surrounding wells

- ▶ Prior to plugging, well operators should be able to reclassify coal wells to noncoal wells by utilizing the same information sources described above.

Benefits of Reclassifying a Well from a Coal to a Noncoal Status Prior to Plugging

- ▶ Eliminate the need and cost to identify mineral owners associated with wells that can qualify as noncoal.
- ▶ Avoid delays associated with the 15 day objection period required by alternative methods and materials regulations.
- ▶ For wells where the surface/coal protective casing is anchored with a packer or cement, significant cost can be avoided by reclassifying qualifying wells to noncoal. Examples of cost saving measures include:
 - Eliminate the need to perforate or cut irretrievable surface or coal casing
 - Eliminate the need to run and cement-to-surface a string of 4-1/2" or larger casing



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
OFFICE OF OIL AND GAS MANAGEMENT

DEP USE ONLY	
Application Tracking #	

Proposed Alternate Method or Material for Casing, Plugging, Venting or Equipping a Well

Well Operator		DEP ID#		Well Permit or Registration Number	
Address				Well Farm Name	
City		State	Zip Code	Well #	Serial #
Phone		Fax		County	Municipality
				Allegheny	Pine Township

*A proposed alternate method is subject to provisions in §3221 of the 2012 Oil and Gas Act, 58 Pa. C.S. §3221 Section 13 of the Coal and Gas Resource Coordination Act, 58 P.S. §513 and 25 PA Code §§78.75-78.75a (relating to Alternate Methods.) **Attach proof of notification of coal operator(s).***

Describe in reasonable detail using a written description and / or diagram:

1. the proposed alternate method or materials, and
2. the manner in which the alternative will satisfy the goals of the laws and regulations.

EXAMPLE OPERATOR requests the status of well 37-003-12345 be updated from coal to non-coal, based on the supporting information obtained from Mineral Resource Report 68, Bituminous Coal Resources In Western PA, Commonwealth of PA Department of Environmental Resources Bureau of Topographic and Geologic Survey. Please refer to Plates 1 through 13 (attached).

Mineral Resources Report 68: Plate 5: Middle Kittanning Coal Seam

Example Well: Middle Kittanning Coal Seam: Status is Inferred
Latitude: 40.6713197
Longitude: -80.007743

EXPLANATION

RELIABILITY OF DATA AND GENERAL THICKNESS

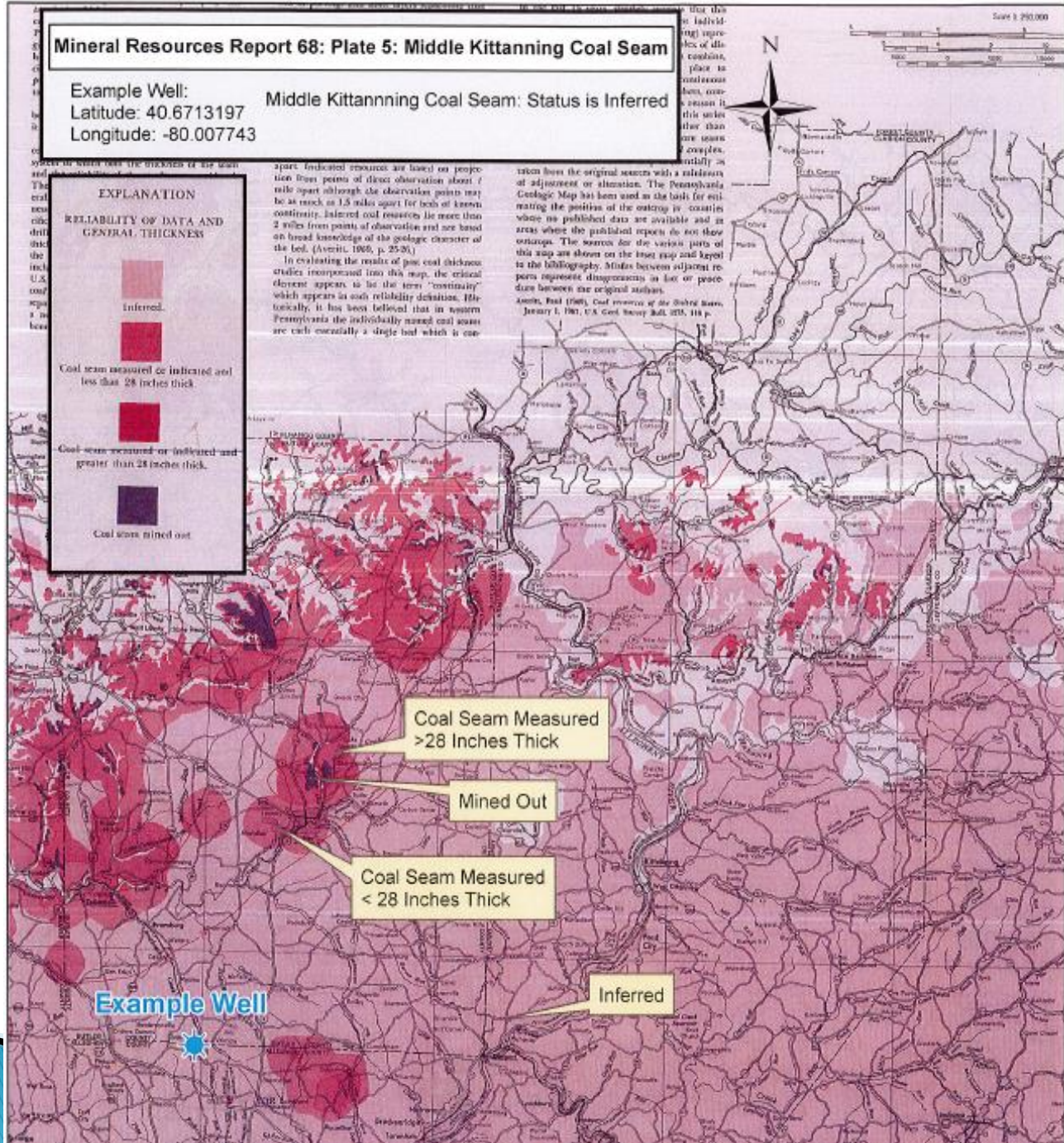
- Inferred
- Coal seam measured or indicated and less than 28 inches thick
- Coal seam measured or indicated and greater than 28 inches thick
- Coal seam mined out

apart. Indicated resources are based on projection from points of direct observation about 1 mile apart although the observations points may be as much as 1.5 miles apart for both of known continuity. Inferred coal resources lie more than 2 miles from points of observation and are based on broad knowledge of the geologic character of the bed. (Averitt, 1965, p. 25-26)

In evaluating the results of past coal thickness studies incorporated into this map, the critical criteria incorporated into this map, the critical element appears to be the term "continuity" which appears in each reliability definition. Historically, it has been believed that in western Pennsylvania the individually named coal seams are each essentially a single bed which is con-

tinuous from the original sources with a minimum of adjustment or alteration. The Pennsylvania Geologic Map has been used as the basis for estimating the portions of the country in question where no published data are available and in areas where the published reports do not cover outcrops. The sources for the various parts of this map are shown on the inset map and keyed to the bibliography. Status between adjacent reports represent discrepancies in list or procedure between the original sources.

Averitt, Paul (1965). Coal resources of the District of Columbia. Part 1965. Coal Survey Bull. 275, 114 p.







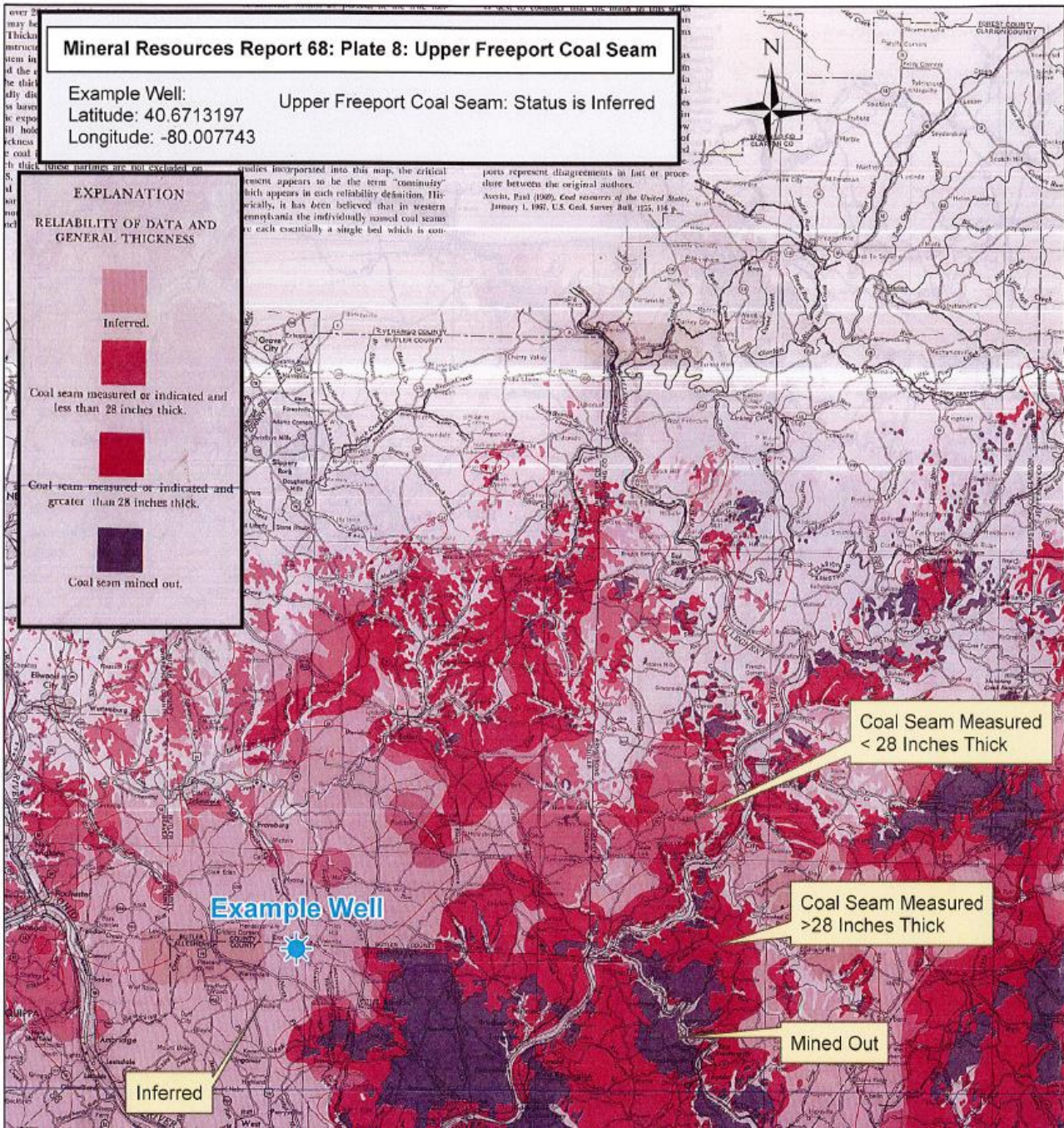
Mineral Resources Report 68: Plate 8: Upper Freeport Coal Seam

Example Well:
Latitude: 40.6713197
Longitude: -80.007743
Upper Freeport Coal Seam: Status is Inferred

EXPLANATION

RELIABILITY OF DATA AND GENERAL THICKNESS

-  Inferred.
-  Coal seam measured or indicated and less than 28 inches thick.
-  Coal seam measured or indicated and greater than 28 inches thick.
-  Coal seam mined out.



Example Well

Coal Seam Measured < 28 Inches Thick

Coal Seam Measured > 28 Inches Thick

Mined Out

Inferred

Mineral Resources Report 68: Plate 9: Pittsburgh Coal Seam

Example Well: Pittsburgh Coal Seam: Status is absent
 Latitude: 40.6713197
 Longitude: -80.007743

EXPLANATION

RELIABILITY OF DATA AND GENERAL THICKNESS

Inferred.

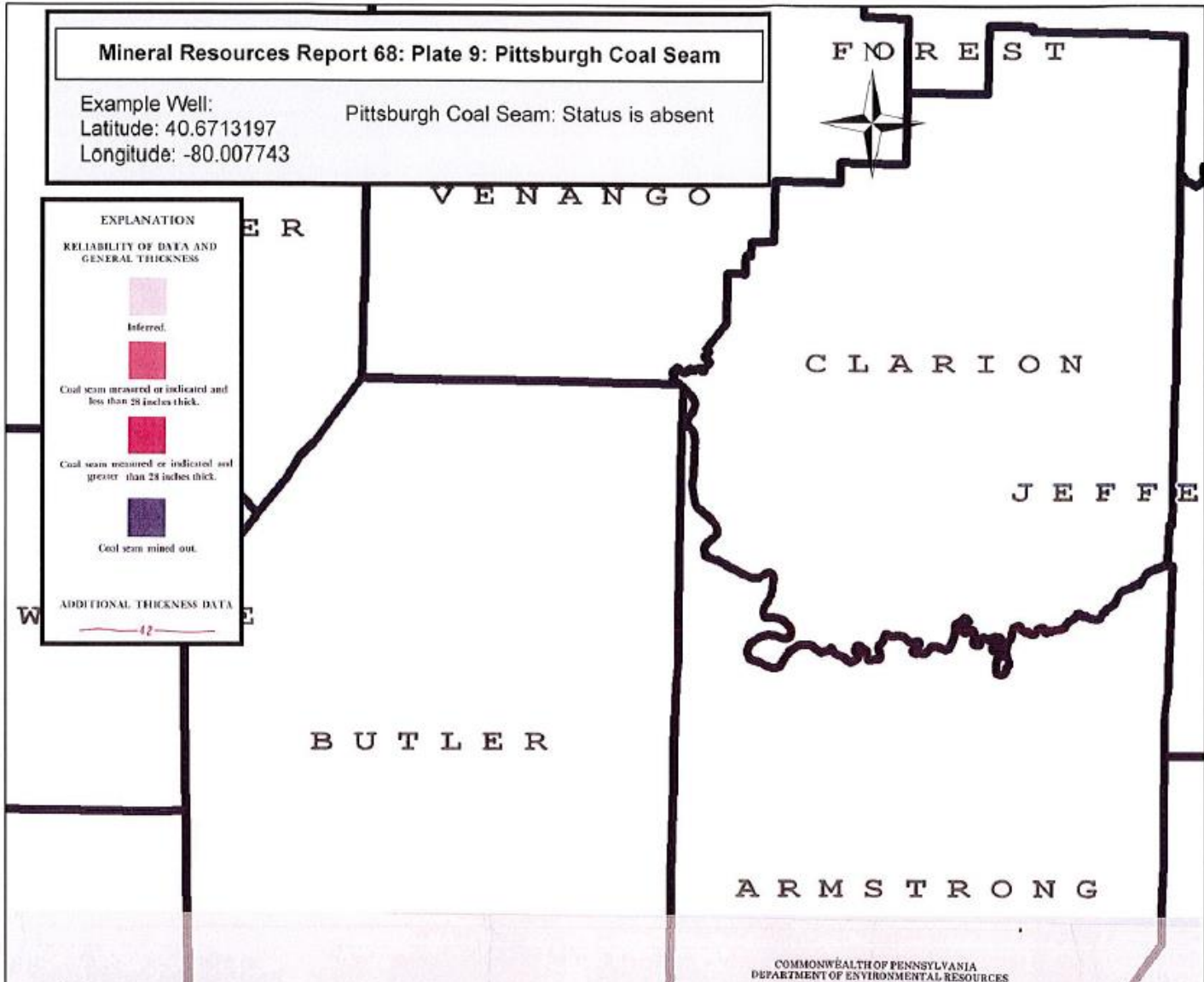
Coal seam measured or indicated and less than 28 inches thick.

Coal seam measured or indicated and greater than 28 inches thick.

Coal seam mined out.

ADDITIONAL THICKNESS DATA

42



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 DEPARTMENT OF ENVIRONMENTAL RESOURCES

ness based on measurements obtained from spe-
 cific areas. In the case of the Pittsburgh coal seam, the thickness of coal is derived by subtracting from the coal interval any non-coal partings over 3/8 inch thick (those partings are not excluded on U.S. Bureau of Mines maps) and excluding any coal benches at the top or bottom which are separated from the main body of the coal by a non-coal parting thicker than the separated bench. The coal thickness given is thus based by an economic factor: the measurability of the

and of partings and shale layers separating coal seams. The discontinuous nature of coal thickness data is customarily divided into three categories—measured, indicated, and inferred, which are defined in the following way.

Measured coal resources are those for which the extent and thickness of the coal seam is so well defined that computed tonnage is judged to be accurate within 20 percent of the true tonnage. The density of points of observation re-

In evaluating the results of past coal thickness studies incorporated into this map, the critical element appears to be the term "continuity" which appears in each reliability definition. Historically, it has been believed that in western Pennsylvania the individually named coal seams are each essentially a single bed which is continuous across the entire Main Bituminous Field; and, coal thickness and reserve studies have expressed results and reliability based on this concept. A growing body of detailed work pro-

continuous Pittsburgh coal and, perhaps, a few others, complexity appears to be the rule. For this reason it is best to consider that the maps in this series show generalized thickness trends rather than specific thicknesses.

The data shown on this map is essentially as taken from the original sources with a minimum of adjustment or alteration. The Pennsylvania Geologic Map has been used as the basis for estimating the position of the outcrop in counties where no published data are available and to

areas where the outcrop is shown. This map are shown in the bibliography.

FAQ/DEP Policy Document: Pulling Uncemented Surface Casing from Pre-Act 223 Wells During Well Plugging

- ▶ Many pre-Act wells were constructed using uncemented surface casing. The regulations require the operator to remove or perforate and cement the casing strings, but there are circumstances when the procedure is not advisable.
- ▶ The DEP will review and consider for approval alternative methods for plugging under § 78.75 that do not include pulling or perforating and squeezing uncemented surface casing when the operator completes the following well assessment:
 - (1) Evaluation of the well to ensure that no brines, oil, or gas is flowing to the surface outside of the surface casing; and
 - (2) Evaluation of the well to ensure that the surface casing does not penetrate any brine-, oil- or gas-bearing zones.

FAQ/DEP Policy Document: Pulling Uncemented Surface Casing from Pre-Act 223 Wells During Well Plugging

- ▶ If the operator can ensure that and the assessments under (1) and (2) do not identify any vertical movement of fluids or the potential for the vertical movement of fluids, the operator may submit an alternative method to the Department for review in advance of plugging activities. **Allowing the uncemented surface casing to remain affords the ability to re-enter the well if additional work is needed**
- ▶ For wells penetrating a workable coal seam (as determined by current Department policy) that are equipped with a separate and distinct coal protective casing deeper than any shallower strings in the well, or for wells with a combined surface and coal-protective casing serving as the only shallow casing string other than the conductor pipe, an operator should comply with the provisions of § 78.93(a)(4)
- ▶ **DEP recommended language to be used on the Alternative Method form can be found on the DEP website**

Plugging Requirements for Cased vs Open Holes with Untreated Formations

- ▶ **Cased and Cemented Holes** – all formations/stratum bearing or have borne oil, gas or water shall be plugged with cement a minimum of 50 feet below to 100 feet above the formation
 - Differing interpretations of the rule has led to confusion and unnecessary spending
 - *Should formations that exist behind cemented casing that are generally expected to be oil, gas, or water bearing be plugged (cemented inside the casing) if they have NOT been treated/stimulated?*

Plugging Requirements for Cased vs Open Holes with Untreated Formations

- ▶ **Open holes without production casing or removed production casing** – all formations/stratum bearing or have borne oil, gas or water shall be plugged with cement a minimum 50 feet below to 50 feet above the formation
- ▶ **Other stratum above the cemented portion of the production casing** bearing or have borne oil, gas or water shall be plugged by filling the hole with nonporous material to 20 feet above the stratum and setting a 50 foot plug of cement
 - *Why are formations at different depths of the wellbore cemented differently?*
 - The phrase “bearing or have borne oil, gas or water” needs to be precisely defined

Well Plugging Workgroup – Ongoing Efforts

- ▶ **Alternate Methods and Materials**
 - CDAC has engaged a team at the University of VA's School of Civil and Environmental Engineering that's working to synthesize and test the properties of organoclay-based composite materials that can be used to stabilize and seal wellbores, preventing the vertical flow of oil and gas.
 - These composites consist of bacteria that interact with modified clay particles to swell in environments containing light chain hydrocarbons. The swelling will restrict hydrocarbon flow and improve structural integrity within the wellbore.

- ▶ **Exploring Commonsense and Properly Scaled E&S Provisions for Well Plugging Projects**
 - Considerable costs for E&S planning and preparation can be incurred for projects that are relatively low impact and occur over a short period of time. It has been suggested that DEP could provide E&S training that will focus on the use of necessary BMPs, but relieve operators of written plans if plugging operations exceed 5,000 sq. ft.

Orphan or Abandoned Well Program (OAWP)

- ▶ Description of Act 13 Impact Fee Distributions
 - \$18M allocated to Conservation Districts, DEP, PUC, PA Fish & Boat, etc....
 - Of the remaining balance, 60% of the funds go the Unconventional Gas Well Fund (distributed to municipalities w/ unconventional wells)
 - 40% of the funds are allocated to the Marcellus Legacy Fund (MLF)
 - 20% of those funds are distributed by the Commonwealth Financing Authority (CFA) to its 7 highly competitive Act 13 grant programs, one of which is the OAWP.
 - 80% of the remaining funds are distributed among 5 additional statewide initiatives.

Orphan or Abandoned Well Program (OAWP)

▶ OAWP Eligible Applicants

- Municipalities
- Councils of Government
- Authorized Organization – A tax-exempt entity involved in research, development, education, etc.
- Institution of Higher Education
- Watershed Organization
- **For Profit Organization – other than “producers” of natural gas as defined in Act 13**
 - **Producer** – A person or its subsidiary, affiliate or holding company that holds a permit or other authorization to engage in the business of severing natural gas for sale, profit or commercial use from an **unconventional** gas well in this Commonwealth.
 - Companies who specialize in plugging are **not** eligible to complete the work, as outlined within the grant application

Historical Review of the OAWP

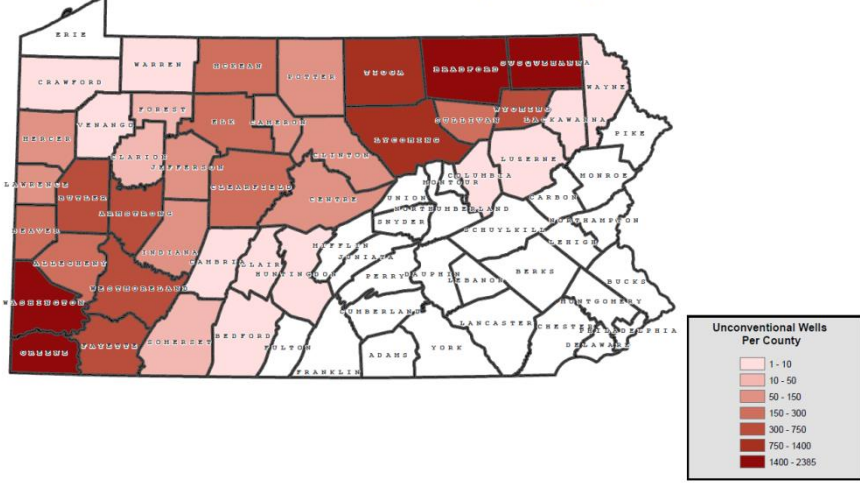
Commonwealth Financing Authority: Act 13 Programs Fund Distributions

Program	Total # Apps	Total # Appr Apps	Total Amt of Grants	Percent Approval Rate	Percent of Total \$
GREENWAYS, TRAILS AND RECREATION (GTR)	1,590	500	\$64,326,999	31.45%	62.40%
FLOOD MITIGATION	192	58	\$13,651,667	30.21%	13.24%
WATERSHED RESTORATION AND PROTECTION	239	89	\$13,192,024	37.24%	12.80%
ABANDONED MINE DRAINAGE ABATEMENT & TREATMENT (AMDAT)	72	22	\$8,776,739	30.56%	8.51%
ORPHAN OR ABANDONED WELL PLUGGING	26	8	\$1,172,841	30.77%	1.14%
BASELINE WATER QUALITY DATA (BWQD)	28	5	\$1,115,149	17.86%	1.08%
SEWAGE FACILITIES PROGRAM	115	22	\$854,163	19.13%	0.83%
Grand Total:	2,262	704	\$103,089,582		

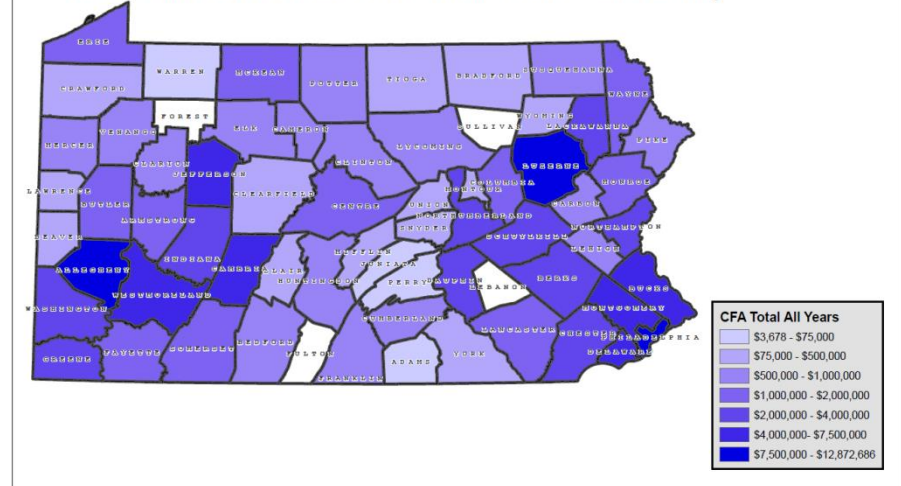
- OAWP, Inception through 2017 – \$1.17M
- Total PAID Impact Fees, Inception through 2017 – \$1.43B
- **0.08% of total Impact Fees have gone to the OAWP**

CFA Grant Program Background

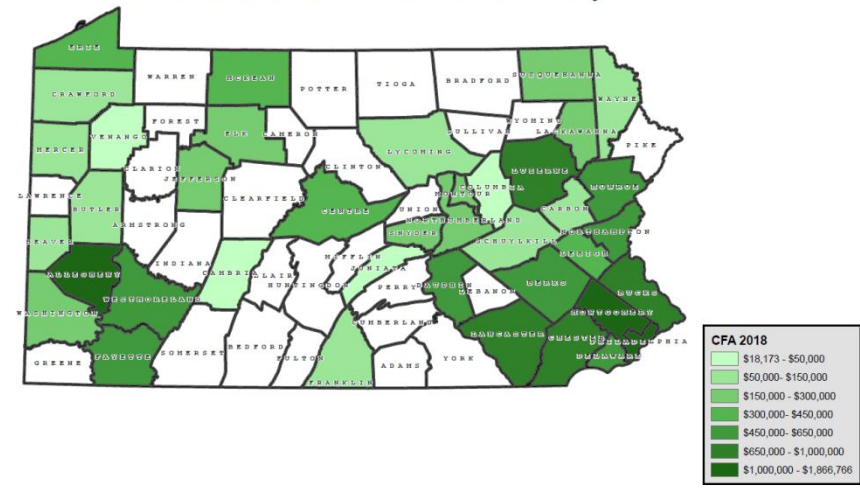
Unconventional Wells Drilled by County



CFA Funds Awarded Total Of All Years Per County



CFA Funds Awarded 2018 Per County



Factors Contributing to the Undersubscription to the OAWP

- Companies who specialize in well plugging are not able to both submit a grant application and perform the work because of the bid requirements for all Act 13 CFA Programs
- Inadequate compensation
- Ineffective public awareness. Potential applicants may have heard of the program, but lack an understanding of the program guidelines and the application process
- Lack of a clear path for grantees to obtain liability relief

Proposed Changes to improve the Success Rate of the OAWP

➤ **Policy Changes**

- Increase the current grant cap of \$250,000
- Allow and encourage companies who specialize in well plugging to submit grant applications and perform the work themselves
- Allow for a higher percentage of the grant amount to be used for engineering and administration

Proposed Changes to improve the Success Rate of the OAWP

➤ **Administrative Changes**

- Incorporate guidance for securing liability relief under the Environmental Good Samaritan Act
- DEP assistance with acquiring landowner consent
- Promotion of shovel-ready projects
- Update guidance to reflect that the window to complete the grant project may be extended
 - Initial period – 3 Years
 - Grantees may request up to 2 extensions
 - Limits to 5 years in total
- Provide clarity relating to Section III C. 6. Bidding Requirements of the OAWP Program Guidelines

Funding/Incentive Concepts, cont.

- CFA and OAWP (long term improvements) – introduce legislative change that would allocate dedicated levels of grant funding for exclusive use in association with well plugging.
- Tax Incentive Program – provide income tax credits for those who make expenditures to plug any oil and gas well
- Plugging Cost Reimbursement Program – full or partial reimbursement to an entity that voluntarily plugs an orphan or abandoned well
- Dormant Oil and Gas Act and Unclaimed Property Act – allocate earned interest to fund orphan and abandoned well plugging projects
- Permit Fee Credits – operators may earn credits for plugging wells that may be applied to DEP permit fees
- Compliance Resolution Via Well Plugging – fulfilling fines and penalties via services rendered for or the funding of approved plugging projects
- Research-based Initiatives – develop partnerships with academia to explore research that may reduce the costs associated with well plugging

Improvements Benefit All Stakeholders

- ▶ Collectively, our plugging liability in PA is enormous; but it's reasonable to conclude that only a small percentage of wells represent a significant safety or environmental threat at any given time. **Plugging projects should be prioritized accordingly.**
- ▶ All wells should receive regular inspections to document changes in conditions that may require a change in plugging priority
- ▶ Consider practical approaches to simplify plugging regulations
 - Eliminate requirement for plugs over each interval (oil/gas/water bearing formations)
 - Revise the “attainable bottom” determination process
 - Investigate feasibility of using alternative plugging materials

Improvements Benefit All Stakeholders

- ▶ Focus on ways to increase efficiency and reduce cost through the use of alternative methods and materials.
- ▶ Develop incentive programs to encourage well plugging.
- ▶ Address and resolve the funding issues that limit the amount of work that can be done – focus first on funds that are already paid by the industry and available for well plugging such as the OAWP grant program.
- ▶ Consider amendments to the Environmental Good Samaritan Act that are more specific to well plugging and abandonment projects.
- ▶ Educate the public concerning the nature and risk of abandoned wells.

CDAC is welcoming all
comments, ideas, and
suggestions.

Thank you!