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Gauging the Economic Impact of Marcellus Shale Drilling in the Pittsburgh Region

Frank Gamrat, Ph.D., Sr. Research Assoc.
Jake Haulk, Ph.D., President
Allegheny Institute for Public Policy

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305 Mt. Lebanon Blvd.◆ Suite 208 ◆ Pittsburgh, PA 15234
Phone: 412-440-0079 Fax: 412-440-0085 www.alleghenyinstitute.org

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Key Findings

The proponents of drilling for gas in the Marcellus Shale formation are quick to point out the economic benefits this new industry is bringing to the Pittsburgh region and the state as a whole. This report attempts to gauge the economic impact of Marcellus Shale drilling by examining employment, sales tax remittances, and reported taxable income in counties where drilling is taking place. The key findings of this report are:

- Marcellus Shale drilling in the Pittsburgh MSA began in 2007 and ramped up rapidly, with 273 wells drilled in 2010 and appears to be sustaining that pace in 2011.

- The region's mining and logging sector, which includes gas drilling and extraction, is definitely adding jobs, principally as a result of gas drilling. From May 2007 to May 2011 the region saw employment rise by 66 percent (3,200) in this sector at a time when overall private sector employment decreased by 1.4 percent. As a matter of perspective, the 8,000 payroll jobs in mining and logging represent less than one percent of the more than one million people on the region's private payrolls. Moreover, the booming growth in mining jobs and the presumed increases in employment directly related to drilling or indirectly benefitting from the enhanced activity, such as retail and restaurants, provide a reasonable, if only partial, explanation of why the region's employment situation compares very favorably to what is happening nationally.

- Sales tax remittances for all counties in the Pittsburgh region fell from fiscal year 2007-08 to fiscal year 2009-10. During this time the nation was plunging into a deep recession and the effect of the downward pull of the recession is hard to separate from any upward push the industry may have had on sales tax remittances from the counties in the area. However, it is noteworthy that the counties with the highest levels of drilling activity had smaller drops in tax remittances, suggesting that the income and sales resulting from gas drilling was acting to limit the negative impact of the recession.

- In examining data of four counties in the Northeastern part of Pennsylvania where Shale drilling has been very intense compared to the Pittsburgh MSA, it was discovered that sales tax remittances had increased for all but one of the counties and increased quite substantially in a couple, defying the recessions effects. While sales tax remittance figures do not provide iron-clad proof of increased economic activity as a result of Shale drilling, the sales tax increase in these counties with very high levels of drilling activity would be hard to explain in any other way.

- Taxable income increases reported from 2006 through 2008 were generally found to be greater in counties with more elevated levels of Shale drilling activity than those with low levels or no activity at all. However, while highly suggestive, this relationship merely shows a strong correlation and cannot be viewed absolutely as a causal relationship. On the other hand, pending a plausible alternative explanation, it is reasonable to give gas drilling much of the credit.

- Under a section of taxable income called rent and royalties, we find perhaps the strongest evidence of the positive economic influence of Marcellus Shale drilling. Rents and royalties represent the income leaseholders would receive from allowing drilling to take place on their land. In the Pittsburgh MSA, Washington County had the largest increase to this taxable income at 112 percent. In the Northeastern counties in the sample, Susquehanna is the leader with an increase of nearly 1,600 percent. The smallest increase among the Northeastern counties was in Tioga at 381 percent. Among counties without Shale activity the largest increase was in Mercer County at 24 percent.

- In sum, there is a very strong case to be made that Marcellus Shale is having significant, positive impacts on the economies of counties where drilling is occurring; on income, especially rents and royalties, taxable sales and employment.

Introduction

It has been called the state's most vibrant industry—drilling for and extracting Marcellus Shale gas. While geologists have known about the natural gas reserves trapped deep in the Marcellus Shale formation for about a decade, drilling did not begin until about 2007[1]. Thus, the industry is still in its infancy and debate has begun as to how valuable it will be to the state and regional economies. This report focuses on the jobs, income and tax impacts of the drilling activity but does not address the economic impact of gas production once the wells are drilled.

Employment

There is no question that Marcellus Shale drilling is producing jobs in the area and across the state. But how many jobs have been created as a result of Marcellus activity is not clear cut or easy to nail down. A report from the Pennsylvania Department of Labor and Industry (L&I) notes that employment in the "core industries were up 9,300 (+97%)" from the fourth quarter of 2007 to the fourth quarter of 2010.[2] Furthermore the report claims that from the fourth quarter in 2009 to the first quarter of 2011 "72,000 new hires were reported within the Marcellus Shale core and ancillary industries". Note that "new hires" do not reflect actual net job increases and must be viewed with some caution in terms of economic impact.

L&I identified six core industries and thirty ancillary industries related to Marcellus Gas drilling to arrive at their figures. The core industries comprise the mining sector (crude petroleum and natural gas extraction, natural gas liquid extraction, drilling oil and gas wells, support activities for oil and gas operations), the construction sector (oil and gas pipeline and related structures), and the transportation sector (pipeline transportation of natural gas).

The ancillary industries include a wide variety of industry sectors such as: manufacturing (oil and gas field machinery and equipment manufacturing, iron and steel mills), professional, scientific, and technical services (engineering services), transportation (general freight trucking), and utilities (sewage treatment facilities).

An important caveat here: while the hiring numbers reported by the L&I sound large, they represent a small percentage of the overall employment count in the state. For example, establishment payroll data collected by the U.S. Bureau of Labor Statistics shows 31,100 employees across Pennsylvania working in the "mining and logging" sector in May 2011.[3] Overall there were 4.961 million people working across the state. Thus, the mining and logging sector in Pennsylvania comprises less than one percent (0.61) of the payroll jobs. In the Pittsburgh metropolitan statistical area (MSA) there were 8,000 employees in the mining and logging sector also representing less than one percent (0.80) of the more than one million people on payrolls.

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[1] The first "exploratory" well was drilled in 2003 in Washington County with the first "production" well drilled in 2005. http://geology.com/articles/marcellus-shale.shtml.

[2] Pennsylvania Department of Labor & Industry. "Marcellus Shale Fast Facts: June 2011 Edition". www.paworkstats.state.pa.us.

[3] This sector includes mining, quarrying, oil and natural gas extraction, and the cutting and transporting of timber.

That said, this relatively small sector (in terms of jobs count) has seen remarkable growth despite a serious national recession and anemic recovery. In May 2007 there were 20,600 jobs in the mining and logging sector across Pennsylvania but four years later the number had climbed to 30,100—a 46 percent rise. Growth of mining and logging jobs the Pittsburgh MSA over the same four year period mirrored that of the state with employment increasing 66 percent, rising from 4,800 in May 2007 to 8,000 in May 2011. There can be little doubt that it is the mining component driving the sector's increase and gas drilling accounts for the bulk of mining jobs gains.

Over the May 2007 to May 2011 period, private employment in the Commonwealth slipped from 5.076 million to 4.961 million—a decrease of 2.3 percent. Meanwhile, in the Pittsburgh MSA private employment decreased 1.4 percent from May 2007 (1.027 million) to May 2011 (1.013 million). In light of the decline in total jobs, the performance of the mining and logging industry (principally driven by shale drilling) can fairly be called a boom. And, unquestionably this sector and its multiplier effects have contributed to the relatively good jobs picture in Pennsylvania and the Pittsburgh region when compared to the nation as a whole.

Keep in mind that the mining sector includes all types of mining including coal, for which this area has been well known. And there was a natural gas component in the Pittsburgh region prior to the drilling for gas in the Marcellus Shale formation. Note however, that from May 2005 to May 2007, employment in mining and logging had had actually dropped by two hundred jobs (5,000 to 4,800). Once the drilling began in earnest in 2008 (only eight wells were drilled in 2007 as compared to 65 in 2008), mining employment also moved higher and by May 2008, 500 jobs had been added—almost certainly a result of Shale drilling.

Counties in the Pittsburgh MSA

The Pittsburgh MSA consists of seven counties: Allegheny, Armstrong, Beaver, Butler, Fayette, Washington, and Westmoreland. Every county in the MSA has at least one Shale gas well. The following table shows the total number of permits and completed gas wells in each county from 2007 through June 6, 2011[4].

[4] Pennsylvania Department of Environmental Protection: http://www.dep.state.pa.us/dep/deputate/minres/oilgas/new_forms/marcellus/marcellus.htm and Pittsburgh Post-Gazette: http://shale.sites.post-gazette.com/

Cumulative Activity 2007-2011

County	Permits Issued	Wells Drilled
Allegheny	10	3
Armstrong	119	53
Beaver	9	1
Butler	211	82
Fayette	228	93
Washington	698	370
Westmoreland	242	127
Totals	*1,517*	*729*

Washington County leads the region with the most permits and wells (698 permits/370 wells) with Westmoreland County coming in a distant second (242 permits/127 wells). The county with the least activity is Beaver (9 permits /1 well) followed by Allegheny (10 permits /3 wells). Most of the wells in the MSA were drilled in 2010 (273) and 2009 (266). Through the first five months of 2011 there have been 117 wells (an average of 23 per month) drilled. Extrapolating that pace to the rest of 2011 would put the wells drilled count at 280. It appears the pace of drilling has plateaued, at least for the time being. Perhaps the exuberant gains from 2007 to 2009 could not be sustained.

Moreover, it is important to bear in mind that the pace of drilling depends on the price for natural gas, which in turn will be determined by national and global supply and demand. Drilling for gas in the Marcellus Shale is an expensive undertaking because the gas is trapped in shale formations many thousands of feet underground. The price of gas received by drillers must cover their costs, including both operations and capital outlays. When profit margins are high drilling will strengthen. Conversely, when profits are small or non-existent, new drilling will slow. Of course, there will likely be some speculative activity for some time based on the need to maintain long term viability and to identify the rich pockets of gas.

Another element to consider with regard to the activity in the Pittsburgh region is the very strong pace of permitting and drilling in the Northeastern counties of the Commonwealth. For example in Bradford County there have been more than 1,600 permits issued since 2007 with 671 wells drilled. Tioga County with 1,076 permits and 489 wells is also a very strong performer. Lycoming with 548 permits and 241 wells and Susquehanna with 558 permits and 225 wells are also far ahead of counties in the Pittsburgh region with the lone exception of Washington County. Meanwhile, between 2007 and 2010, mining jobs jumped by 182 percent in Bradford County and 83 percent in Tioga County[5]. There can be little doubt that the drilling activity has boosted mining jobs considerably in these counties as drilling accelerated.

Tax and Income Effects

Bear in mind that the two labor surveys used by the U.S. Bureau of Labor Statistics, employer and household, are just that—surveys. They are not exact counts, not every employer or

[5] U.S. Bureau of Labor Statistics. Quarterly Census of Employment and Wages. September 2005-2010.

household receives one each month. Thus, it is possible that a significant portion of employment related to drilling activity may not be captured in either survey and more accurate measurements must await further documentation and re-benchmarking. An alternative method to gauge or estimate economic activity generated by the new industry is to look at tax remittances from the counties where known Marcellus Shale drilling is occurring.

It is reasonable to assume that if more people are being employed then sales tax remittances to the state's coffers and reported taxable income would be higher as well. This would be true whether the new workers are locals or from out of the area, although the effect on total taxes generated by local hires would probably be greater. Still, the out- of- area employees have to eat, put fuel in vehicles and have a place to stay. And they are liable for income taxes for money earned in Pennsylvania as well local levies such as Local Services taxes. In short, if additional income is being created by the new jobs related directly or indirectly to shale drilling, there should be some impact on sales taxes remitted and taxable income reported to the state Treasurer from the counties in question.

Sales Tax Remittances

The Pennsylvania Department of revenue publishes The Statistical Supplement for the Pennsylvania Tax Compendium which contains tax remittance data. [6] The most recent sales tax data covers the 2009-2010 fiscal year. The following table shows the sales tax remittances by county for the Pittsburgh MSA from the fiscal 2007-08 year to the most recent fiscal year available.

Sales Tax Remittances (in thousands of dollars)

County	2009-2010	2008-2009	2007-2008	Percent Change
Allegheny*	$532,607	$552,618	$562,098	-5.25
Armstrong	10,045	10,542	10,661	-5.78
Beaver	24,538	25,830	26,721	-8.17
Butler	66,308	67,680	66,424	-0.17
Fayette	29,769	30,061	30,735	-3.14
Washington	56,447	57,672	57,854	-2.43
Westmoreland	111,119	113,026	113,119	-1.77

*Excludes Regional Asset District tax remittances

As mentioned above, 2008 was the year activity commenced in earnest in the Pittsburgh MSA with 65 wells being drilled. However, well activity picked up substantially in 2009 when 266 wells were drilled and in 2010 when 273 more were finished. But as the table above shows sales tax remittances from before most drilling in the area commenced (2007-08) until the most recent data when hundreds were active shows a decline in all counties. Nevertheless, the decreases were much smaller in Butler, Westmoreland, Washington and Fayette Counties where most of the drilling activity was taking place. However, the problem is that just as drilling began in

[6] http://www.portal.state.pa.us/portal/server.pt/community/reports_and_statistics/17303/tax_compendium/602434

earnest, the nation was plunging deep into recession and as a result it is very difficult to separate the impacts of the two events. The fact that counties with more drilling activity had smaller declines does suggest strongly that drilling activity was helping to mitigate the effects of the recession.

As mentioned above the Marcellus Shale drilling activity in the state's Northeastern counties has been much stronger than in the Pittsburgh MSA. How did those counties fare with sales tax remittances? The following table looks at the four counties discussed earlier.

Sales Tax Remittances (in thousands)

County	2009-2010	2008-2009	2007-2008	Percent Change
Bradford	$14,732	$12,784	$12,144	21.31
Lycoming	31,237	30,717	32,087	-2.65
Susquehanna	8,835	8,531	8,022	10.13
Tioga	7,835	7,116	7,582	3.34

The table shows that, with the exception of Lycoming County, all counties in the sample had increases to their sales tax remittances from 2007-08 to 2009-10. In fact, Bradford and Susquehanna Counties had substantial increases. Given the high volume of Marcellus Shale activity in these counties it is a virtual certainty that the increase to sales tax remittances is linked to the economic impact of Marcellus gas activity.

For another comparison we will look at five counties that had no Shale activity in either completed wells or permits awarded: three from the Northwest (Crawford, Erie, and Mercer) and two from the Southeast (Schuylkill and York). The following table shows their sales tax remittances.

Sales Tax Remittances (in thousands of dollars)

County	2009-2010	2008-2009	2007-2008	Percent Change
Crawford	$15,055	$14,900	$15,550	-3.18
Erie	68,190	80,568	81,573	-16.41
Mercer	28,690	27,276	28,180	1.81
Schuylkill	29,424	32,489	32,153	-8.49
York	109,617	113,072	121,182	-9.54

Mercer County is the only one with a small positive increase to their sales tax remittance while the others are negative. Crawford County experienced a small decrease (3.18 percent) while the other three experienced substantial decreases.

While the sales tax remittance figures do not provide conclusive proof of increased economic activity as a result of Marcellus Shale drilling, they do suggest very strongly that a county with substantial activity, like those in the Northeastern part of the Commonwealth, benefitted in terms of taxable sales from Marcellus activity. Once again it is worth noting that during this same time frame the state, and the nation as a whole, was engaged in a substantial recession from late 2008 through early 2010. Even in 2011 the economy is still struggling to regain its pre-recession footing. Thus, it is difficult to separate out the negative effects of the recession with the increase in drilling in Marcellus Shale.

Taxable Income

Income is another indicator of economic activity. If the new industry is hiring more people as claimed, or as current workers are putting in more hours as the industry ramps up, there should be a noticeable increase in taxable income reported to the state. Also as property and mineral rights holders have been entering into leases with drilling companies they too should be reporting higher incomes. The Pennsylvania Tax Compendium shows the taxable income reported for each county. The table below shows the data for the calendar years 2006 through 2008 (unfortunately, the latest income data available) for the counties that comprise the Pittsburgh MSA.

Taxable Income Reported (in thousands of dollars)

County	2008	2007	2006	Percent Change
Allegheny	$31,614,851	$31,955,480	$28,485,226	10.99
Armstrong	1,503,316	1,423,620	1,319,695	13.91
Beaver	3,148,988	3,112,720	2,901,824	8.52
Butler	4,758,011	4,724,674	4,224,448	12.63
Fayette	2,333,194	2,263,449	2,136,437	9.21
Washington	5,137,523	5,080,247	4,567,077	12.49
Westmoreland	7,908,018	7,800,393	7,219,053	9.54

For the counties in the Pittsburgh MSA during the period from 2006 through 2008, income posted fairly healthy gains. While the data cover the beginning of Shale drilling in the area (Butler had 8 wells in 2007), permits were being issued and companies were in the area securing leases and preparing to drill. The numbers are also mostly pre-recession as the economic downturn did not hit the Pittsburgh MSA until late in 2008.

Again to get a better comparison, we will take a look at the income changes in the four Northeastern counties with heavy Shale activity.

Taxable Income Reported (in thousands of dollars)

County	2008	2007	2006	Percent Change
Bradford	$1,121,386	$992,062	$923,562	21.42
Lycoming	2,185,367	2,080,760	1,970,167	10.92
Susquehanna	781,786	652,741	599,446	30.42
Tioga	630,708	584,560	540,257	16.74

In 2007 both Lycoming County (5) and Bradford County (2) had wells drilled. By 2008 all four counties had at least 8 wells with Susquehanna having the most (23). Susquehanna also led the four counties with income growth of more than 30 percent. Lycoming County had the smallest increase (10.92 percent).

Most of the counties in the Northeastern part of the state had higher increases in income compared to counties making up the Pittsburgh MSA (the exception being Lycoming). While the data only captures the beginning of the Shale boom in both regions, the Northeastern part of the state has seen more activity. The following table looks at the changes to taxable income from the five non-Shale counties in the sample.

Taxable Income Reported (in thousands of dollars)

County	2008	2007	2006	Percent Change
Crawford	$1,392,651	$1,399,215	$1,298,671	7.24
Erie	5,197,897	5,199,608	4,752,287	9.38
Mercer	1,938,009	1,986,681	1,833,319	5.71
Schuylkill	2,612,472	2,631,144	2,468,144	5.85
York	9,990,278	10,035,276	9,459,083	5.62

As the table above shows these five non-Shale counties did not enjoy the same level of increases to their taxable income as did the counties with Shale activity, either in the Pittsburgh MSA or the Northern tier. In fact the best performing non-Shale county, Erie (9.38 percent), did not even beat the lowest performing Northeastern county (Lycoming, 10.92 percent). However, bear in mind that, while highly suggestive, this comparison does not constitute iron-clad proof that Marcellus Shale drilling accounts for the better performance in the counties with gas activity.

Taxable Income from "Rent, Royalties, Patents, and Copyrights"

As mentioned above, neither sales tax remittances nor income gains offer unquestionable proof that counties with Marcellus Shale activity are doing better because of the gas "boom". With a recession getting underway just as drilling started to accelerate the opposing economic effects are bound together and hard to separate.

But there is a section of the income tax form that may offer a clearer indication of the benefits of this new industry—namely "rent, royalties, patents, and copyrights". This section of the income tax form asks about income earned through rents and royalties, such as those obtained from having a lease with a natural gas company. Leases typically involvement payments for the right to drill as well payments based on gas any gas produced at a well on the property.

Again, data are available in the State's Tax Compendium. The following table shows this data for the counties in the Pittsburgh MSA.

Taxable Income—Rent, Royalties, Patents, and Copyrights (in thousands of dollars)

County	2008	2007	2006	Percent Change
Allegheny	$362,045	$332,652	$309,639	16.92
Armstrong	27,487	21,440	20,676	32.94
Beaver	27,431	26,358	22,062	24.34
Butler	63,782	54,104	40,519	57.41
Fayette	58,595	37,584	34,114	71.76
Washington	122,571	64,526	57,681	112.50
Westmoreland	130,768	100,964	95,436	37.02

As can be seen in the table, the income from Washington County in the rents and royalties category more than doubled from 2006 to 2008. As mentioned earlier, Washington County leads the area in the number of permits issued and wells drilled. As to be expected there has been a lot of lease activity in this county. Westmoreland, Fayette, and Butler Counties also had significant permit and well activity and had a significant increase to their rent and royalties remittances (37, 72, and 57 percent respectively). Allegheny and Beaver Counties had the least amount of activity in terms of issued permits (one in Allegheny County) and drilled wells (zero in both counties) during this time and also incurred the lowest percentage increases to their reported incomes from rents and royalties (16.92 and 24.34 percent respectively).

But how does this compare to the more heavily explored Northeastern counties? The following table shows the changes to their taxable income from rents and royalties.

Taxable Income—Rent, Royalties, Patents, and Copyrights (in thousands of dollars)

County	2008	2007	2006	Percent Change
Bradford	$144,891	$14,547	$15,715	821.99
Lycoming	137,726	28,788	27,044	409.27
Susquehanna	135,864	14,406	8,018	1,594.49
Tioga	40,820	9,340	8,477	381.54

For these counties the percentage increase in the rent and royalties income is exceptional. Susquehanna leads the pack with a percentage increase of nearly 16 times more income in this category in 2008 than in 2006. Bradford County, which has the most leases (1,607), finishes second in this list with an 8 fold jump in rent and royalties income. Lycoming and Tioga Counties come in at around 4 times as much. Clearly the strong presence of the Marcellus Gas drilling industry with its combined total of 3,789 permits and 1,626 drilled wells in these four counties (from 2007 through June 2011) and the leases and royalties they bring are having a tremendous impact on incomes in these counties. This income category accounts for a large share of the total income increase in these counties during the 2006 to 2008 period.

To provide more perspective on this category, a final look at the sample of counties without a Shale presence is presented. The following table shows figures for the five counties from the Northwest and Southeast part of the state.

Taxable Income—Rent, Royalties, Patents, and Copyrights (in thousands)

County	2008	2007	2006	Percent Change
Crawford	$29,023	$25,161	$23,365	24.22
Erie	74,060	72,613	65,338	13.35
Mercer	35,993	29,555	28,922	24.45
Schuylkill	24,823	22,983	21,033	18.02
York	121,007	115,127	104,146	16.19

As can be seen from this table the percentage increase to rents and royalties in these counties is much lower than those seen in the Northeastern counties. In fact, the largest increase, 24.45 percent in Mercer County, tops only Beaver (24.34 percent) and Allegheny (16.92 percent)

Counties in the Pittsburgh MSA. And during the given time frame, 2006 through 2008, Beaver County did not have a single permit issued while Allegheny County only had one and neither had an active well that would have been paying royalties.

The data from income tax returns, specifically the “rents, royalties, patents, and copyright” section offers the clearest and most conclusive evidence of the potential financial impact arising from Marcellus Shale drilling activity. While any lease terms and royalties earned from productive wells will vary from case to case, it is clear that incomes are being substantially enhanced in the counties where substantial drilling activity is taking place.

Appendix

Marcellus Shale Permits by Year for Pittsburgh MSA[7]

County	2011	2010	2009	2008	2007	Totals
Allegheny	2	2	5	1	0	10
Armstrong	26	42	42	7	2	119
Beaver	0	3	6	0	0	9
Butler	68	76	42	10	15	211
Fayette	27	77	88	36	0	228
Washington	92	249	209	103	45	698
Westmoreland	37	87	88	28	2	242
Totals	**252**	**536**	**480**	**185**	**64**	**1517**

Drilled Wells by Year for Pittsburgh MSA

County	2011	2010	2009	2008	2007	Totals
Allegheny	0	1	2	0	0	3
Armstrong	5	29	17	2	0	53
Beaver	0	1	0	0	0	1
Butler	20	38	8	8	8	82
Fayette	0	19	55	19	0	93
Washington	71	139	138	22	0	370
Westmoreland	21	46	46	14	0	127
Totals	**117**	**273**	**266**	**65**	**8**	**729**

Marcellus Shale Permits by Year for Northern Tier Counties

County	2011	2010	2009	2008	2007	Totals
Bradford	293	830	430	52	2	1,607
Lycoming	128	254	107	45	14	548
Susquehanna	104	230	155	61	8	558
Tioga	185	564	300	27	0	1,076
Totals	**710**	**1878**	**992**	**185**	**24**	**3,789**

[7] Through June 6, 2011. Source: Pennsylvania Department of Environmental Protection: http://www.dep.state.pa.us/dep/deputate/minres/oilgas/new_forms/marcellus/marcellus.htm and Pittsburgh Post-Gazette: http://shale.sites.post-gazette.com/

Drilled Wells by Year for Northern Tier Counties

County	2011	2010	2009	2008	2007	Totals
Bradford	158	386	113	14	0	671
Lycoming	96	107	24	9	5	241
Susquehanna	48	92	60	23	2	225
Tioga	101	266	114	8	0	489
Totals	**403**	**851**	**311**	**54**	**7**	**1,626**