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ECONOMIC UPLIFT FROM MARCELLUS-UTICA DEVELOPMENT IN NEW YORK STATE

Executive Summary

Using well documented data from the experience of drilling and developing the Barnett shale in Texas, we have been able to draw an analogy with our own Marcellus-Utica development in New York State. Most of the Barnett development has been within, or in the general vicinity of Ft. Worth, with that play now extending into 23 counties with a total of 13,740 completed wells through February 2010. Data compiled from the earlier activity through 2007 has revealed that the first 7,170 wells created an annual economic uplift to the area of Ft. Worth and vicinity of $8.2 billion, or approximately $1.14 billion for every 1000 wells drilled and completed in the Barnett shale.

In New York we have both highly prospective Marcellus and Utica shales, with some areas where these formations overlap. Based on formation thickness and reserve potential, the New York play will be more extensive, and more prolific than the Barnett in production of natural gas. Experienced Barnett geologists in Texas believe that it will ultimately be productive over an area of 6000 to 7000 square miles. In our most conservative estimates, total development of the Marcellus and Utica are projected to cover an area of about 13,500 square miles. Using a very conservative estimate in well spacing, we anticipate 81,000 wells will be drilled and completed in that area. With the same ratio of annual economic uplift to wells drilled as has resulted from development of the Barnett shale, we project that New York State will experience an annual economic uplift of $92 billion from the Marcellus and Utica shale development. With less conservative assumptions this could rise to as high as $123 billion. And again, comparing our activity with the Barnett experience, Marcellus-Utica development could result in the generation of 800 thousand new jobs over the approximate 30 years of drilling and development. We anticipate that actual experience will exceed these projections.

ECONOMIC UPLIFT FROM MARCELLUS-UTICA DEVELOPMENT IN NEW YORK STATE

New York State is nearing the final approval for commencement of what will be a huge natural gas play based upon two shale bodies present over much of the State acreage. Despite this impending game changing economic activity, to date there has not been even a preliminary analysis of the potential economic impact of this gas development on the State economy. This report sets forth such an analysis. We are fortunate in that other states, especially Texas and Pennsylvania, are currently in ongoing development of natural gas from shale bodies and can provide information assisting us in analyzing the operational and economic impact that will be felt in New York.

Drilling and production has commenced in Pennsylvania only recently, and the full measure of their natural gas play is not yet apparent. In Texas, however, the natural gas play in the Barnett shale has served not only as a laboratory for development of operational technology for production from the shale, but has also provided a window on the future economic performance that flows from this activity. The Perryman study of the Barnett shale development has been widely recognized as an excellent analysis of a broad range of economic data from the important counties having Barnett shale prospects.

In the mid to late 1980s George Mitchell of Mitchell Energy began considering the idea that gas, known to be present in the Barnett shale, might be produced commercially. Operators had been drilling through the Barnett for years on their way to deeper commercially proven prospects, but believed that the gassy Barnett could not produce enough gas to be economic. Mitchell reasoned that if a well drilled through the shale was adequately stimulated, more gas would flow and economics would improve. He experimented with several kinds of stimulation including hydraulic fracturing, changing ingredients, volumes and pressures until he hit upon a combination that seemed to significantly increase the flow of gas. He was able to get rates as high as1.0 to1.2 million cubic feet per day from some of these wells, and was able to achieve profitability with improved hydro fracing and better drilling and completion cost control. With that success, he figured that if we can do that with a vertical well, why can't we do much better with a horizontal well that will have a lateral leg that extends out into the shale body for a thousand or several thousand feet. With the much greater exposure of the shale to the well bore in the horizontal leg, he applied hydraulic fracturing in several stages and was able to bring initial well rates up very substantially. At that point, he knew he had a winner and leased much more acreage, and the Barnett play took off with production starting in 1999 and expanding every year since then over some 23 counties.

As with most formations, the geology of the Barnett varies considerably over the play area, with the best production coming from the Wise, Denton, and Tarrant County core area, followed by the Parker, Johnson, and Hood County Tier 1 area, and then by the

remaining Counties as the Tier 2 area. In general, drilling and completion costs are now fairly consistent with vertical wells costing about one million dollars to drill and complete, and horizontal wells costing two million dollars drilled and completed. All of these wells have fairly high initial flush production rates but decline rapidly with typical declines of 55 to 60 % in year one, 30% in year 2, 15% in year 3, and 10% per year thereafter.

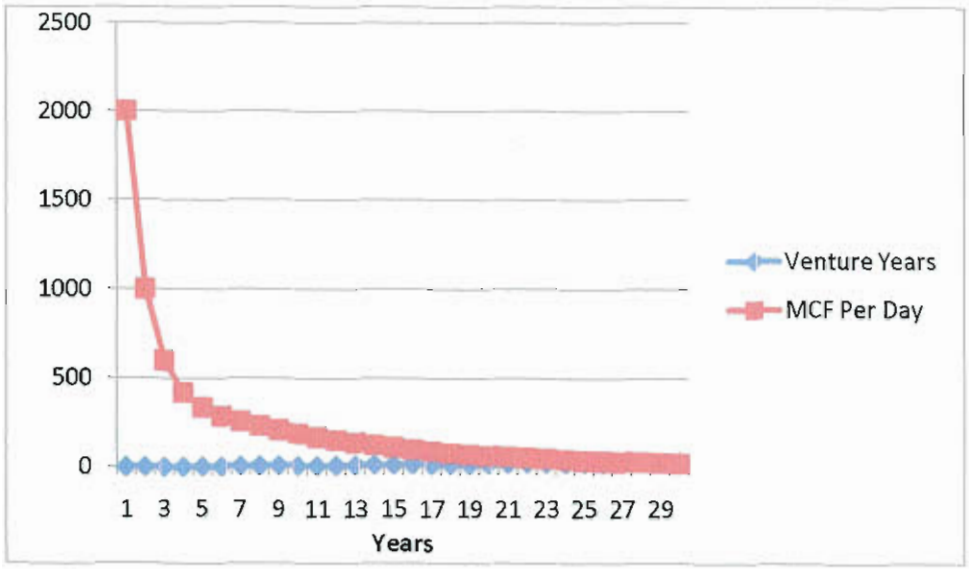
We are fortunate to have current information on drilling and production from the Marcellus formation in Pennsylvania, which has characteristics almost identical to those in New York State. We expect well producing rates obtained from Marcellus shale wells in New York will be about the same as those now producing in Pennsylvania. Although it is too early to be sure, we expect that the rates of production decline in the Marcellus will be quite close to those experienced in the Barnett shale in Texas.

As examples of what we believe can be expected over a range of initial producing rates and cumulative producible gas reserves, we have prepared three well projections in the following Tables P-1, P-2, and P-3. In each of these we have projected average daily production by year over expected producing life to yield, respectively, cumulative reserves of 2.5, 4.0, and 8.0 billion cubic feet of natural gas. There are many reasons for a range of well quality, which will lead to these quantities of producible reserves. To begin there are areas where formation thickness is much greater than in other areas. There is also the fact that in some areas both the Marcellus and Utica will be productive and in some areas both of them will have greater thickness than in other areas. And, of course, there is the basic condition of favorable geology and formation quality that we have mentioned previously. It is quite probable that some wells will have greater reserves than even the 8.0 billion assumed in Table P-3. The U.S Geological Survey Office has estimated that the Barnett in some areas can have 160 billion cubic feet of natural gas in place per square mile. If the Barnett can have that level of in place reserves, it is certainly possible for the combination of Marcellus and Utica to have as much or more. We are too early to estimate what final recovery rates will be achieved, but it is probably reasonable to assume a minimum 30% recovery. That would mean 48 BCF per square mile and if spread over only 6 wells that would be 8 BCF per well. And on the issue of recovery factor, we should keep in mind that a lot of laboratory work is going to be initiated for improving recovery from shale bodies and that will probably result in higher recovery levels. See Tables P-1, P-2 and P-3.

Table P-1

Projected 2.5 BCF Marcellus-Utica Well

Venture Years	MCF Per Day	Cumulative MCF Production
1	2,000	730,000
2	1,000	1,095,000
3	600	1,314,000
4	420	1,467,300
5	336	1,589,940
6	286	1,694,330
7	257	1,788,281
8	232	1,872,837
9	208	1,948,937
10	188	2,017,427
11	169	2,079,069
12	152	2,134,546
13	137	2,184,475
14	123	2,229,412
15	111	2,269,855
16	100	2,306,253
17	90	2,339,012
18	81	2,368,495
19	73	2,395,029
20	65	2,418,910
21	59	2,440,403
22	53	2,459,747
23	48	2,477,156
24	43	2,492,825
25	39	2,506,926
26	35	2,519,618
27	31	2,531,040
28	28	2,541,320
29	25	2,550,572
30	23	2,558,899



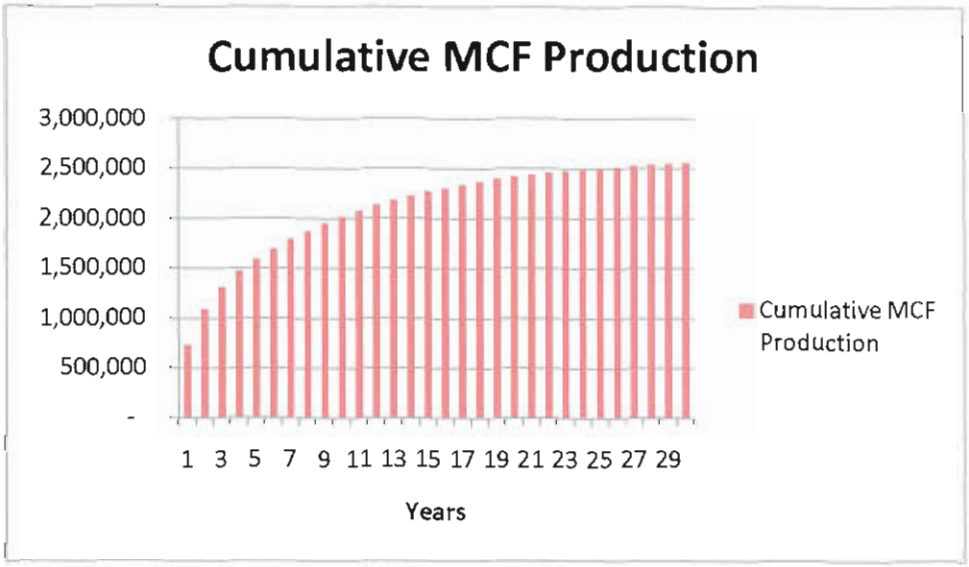
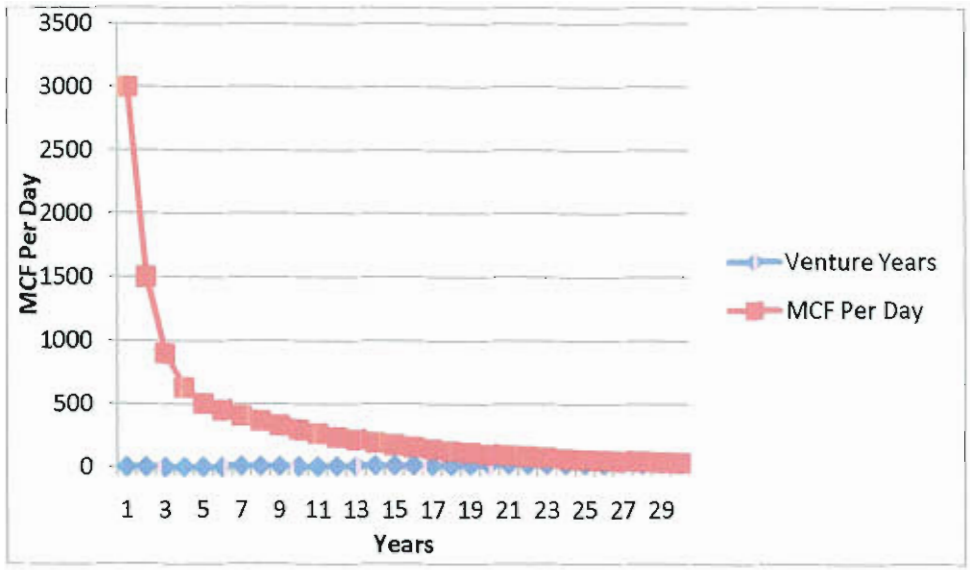
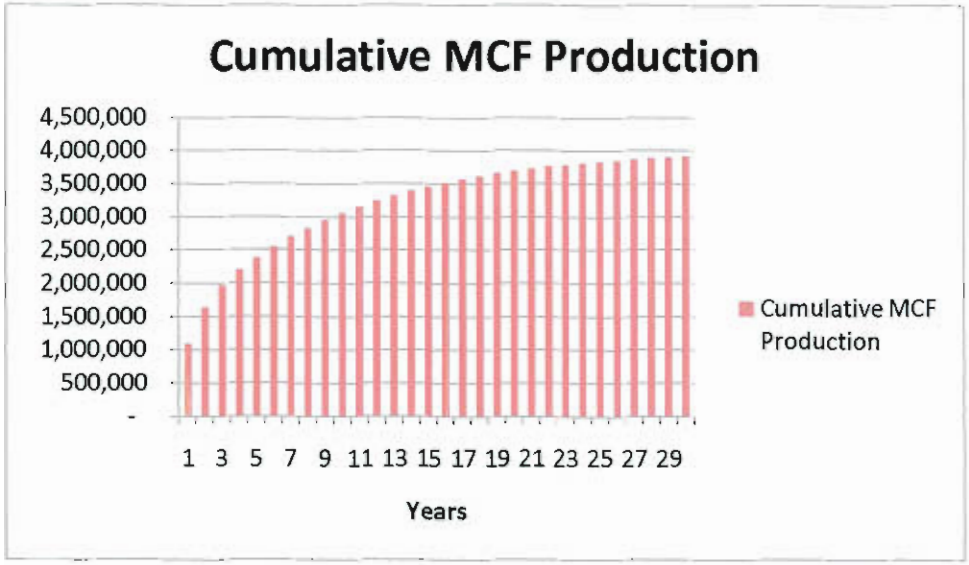


Table P-2

Projected 4.0 BCF Marcellus-Utica Well

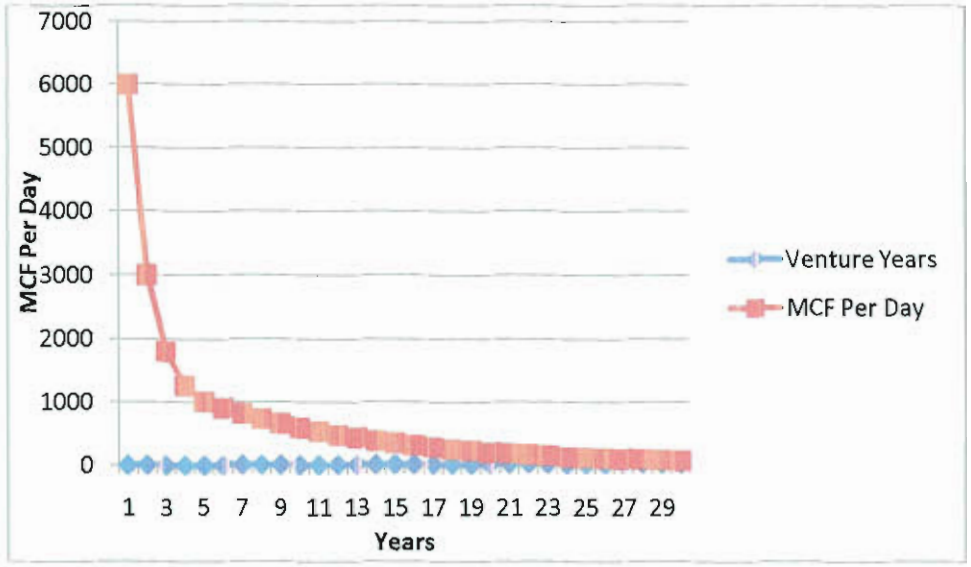
Venture Years	MCF Per Day	Cumulative MCF Production
1	3,000	1,095,000
2	1,500	1,642,500
3	900	1,971,000
4	630	2,200,950
5	504	2,384,910
6	454	2,550,620
7	408	2,699,540
8	367	2,833,495
9	330	2,954,055
10	297	3,062,558
11	268	3,160,211
12	241	3,248,099
13	217	3,327,198
14	195	3,398,387
15	176	3,462,458
16	158	3,520,121
17	142	3,572,018
18	128	3,618,725
19	115	3,660,762
20	104	3,698,594
21	93	3,732,644
22	84	3,763,289
23	76	3,790,869
24	68	3,815,691
25	61	3,838,031
26	55	3,858,137
27	50	3,876,232
28	45	3,892,518
29	40	3,907,175
30	36	3,920,367

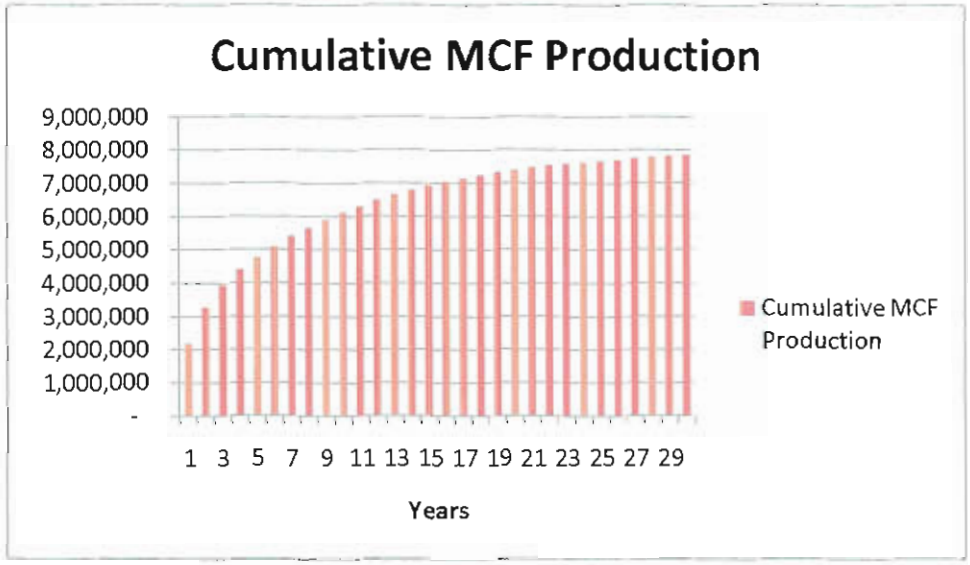




Projected 8.0 BCF Marcellus-Utica Well

Venture Years	MCF Per Day	Cumulative MCF Production
1	6,000	2,190,000
2	3,000	3,285,000
3	1,800	3,942,000
4	1,260	4,401,900
5	1,008	4,769,820
6	907	5,100,948
7	816	5,398,963
8	735	5,667,177
9	661	5,908,569
10	595	6,125,822
11	536	6,321,350
12	482	6,497,325
13	434	6,655,703
14	391	6,798,242
15	351	6,926,528
16	316	7,041,985
17	285	7,145,897
18	256	7,239,417
19	231	7,323,585
20	208	7,399,337
21	187	7,467,513
22	168	7,528,872
23	151	7,584,095
24	136	7,633,795
25	123	7,678,526
26	110	7,718,783
27	99	7,755,015
28	89	7,787,623
29	80	7,816,971
30	72	7,843,384
31	65	7,867,155
32	59	7,888,550





The excellent study of the Barnett by the Perryman Group in Texas has been used by Dr. Timothy W. Kelsey of Penn State University as source of material for an analysis of development and production from the Marcellus shale formation in Pennsylvania. We believe the Penn State analysis of the Marcellus is a good lead-in to an analysis for New York State. The geological similarity of the Marcellus in Pennsylvania to that in New York allows us to project Marcellus development in New York with nearly identical operational characteristics, with the exception of shallower drilling depth. However, in New York, we have added operational requirements, but economic benefit, of a deeper Utica shale body. Actually, the Utica formation has a wider coverage over the counties of New York than does the Marcellus. A review of the geology of both formations suggests the presence of a sweet spot overlap area covering all, or most of nine counties in central, eastern, and southeastern New York. In that area, both formations have good thickness, and fairly high levels of total organic carbon (TOC), which is normally a prerequisite to commercial production of hydrocarbons.

In analyzing the economic impact of natural gas development in New York State, we assume that Marcellus development will be much like the current experience in Pennsylvania. But, in New York, a very well developed Utica shale formation also has great promise of being a prolific producer of natural gas over large portions of the State. Exhibits A, B, and C included in this study provide structural contour maps of the Marcellus and Utica shales where they are present, and a map of the sweet spot area where these formations overlap. We are confident that in the central, eastern, and southeastern portions of the State many wells will be drilled and completed from both formations. Therefore, our conservative projection of 2.5 BCF of gas as the ultimate recovery for a well producing from the Marcellus and, or, the Utica, should understate both the total potential of New York in producing natural gas, and its total economic impact.

Our basic approach in analyzing natural gas development in New York, has been to begin by defining the areas of all counties involved in the play. We, then, have approximated for each county, the reduced area available for drilling based on geologic mapping that shows the absence of Marcellus or Utica formations in portions of the county. We have elected to use square miles as the parameter for area measurement. We begin with the inventory of counties that have areas that are deemed to be geologically prospective for natural gas production from either, or both, the Marcellus and Utica formations. Our source for this information is the excellent study by the Reservoir Characterization Group at the New York State Museum. This team was headed by Richard Nyahay, and the study is the best reference available on these shale prospects in New York State. We have included 37 counties as potentially productive of gas from these formations. For each of these counties, we have obtained the measured area in square miles, reduced it to potentially productive square miles, and eliminated those areas that were shown to be non-prospective geologically. Our next reduction was an arbitrary assumption of terrain or surface obstruction of ten percent, upon which drilling would not be feasible.

It is important to note here that the inclusion of all or part of 37 counties as potentially productive of natural gas from these shale formations does not imply that they will be

commercially productive. The most unforgiving of all elements in the search for hydrocarbon production is geology. Formation characteristics can change abruptly from location to location, and this is especially true of shale bodies where natural porosity and permeability are very limited in all cases. A natural fracture system that is encountered at one well location, may be completely absent at the next. The presence of intervening faults between one location and the next can mean one well is productive and the next is a dry hole. In shale formations the percentage of clay or silica content can significantly influence the level of productivity. Although the use of seismic technology can provide evidence of fracture systems and other encouraging formation characteristics, only drilling the hole can provide the defining information that will reveal the presence of commercial production at a location.

From the Nyahay et al study, we have concluded that the most probable areas for successful commercial production will occur in the Marcellus-Utica overlap area in the central, eastern and southeastern counties of the State. This would be the equivalent of the Core area of the Barnett shale in Texas. That is not to say that there will not be other areas with good commercial production. Only drilling will establish the most prolific areas for production, and there will be a lot of drilling in many of the counties across the State. The Nyahay study simply provides the information on geology and chemical characteristics of the Marcellus and Utica formations that indicates a higher likelihood of commercial success in the central, eastern, and southeastern counties. Further drilling in the State may reveal excellent Utica and Marcellus production that is currently not evident.

We have assumed three levels of success in drilling the prospective terrain available square miles, as 80%, 70%, and 60%, meaning that these percentages of the square miles would yield productive wells. Having assumed the successful productive square miles, we have further assumed an average number of wells per square mile. For each square mile of 640 acres, the NYS DEC allows one vertical well on each 40 acres or 16 wells, but we know that most operators will elect to drill both vertical and horizontal wells. Therefore, we need to focus on the number of wells that would, on average, be drilled in each square mile. It is possible to drill a well with a short lateral on as little as 60 acres, but we assume that most operators will prefer tracts of 130 to160 acres. As knowledge of the subsurface is accumulated through drilling, operators in a given area will modify their well spacing preferences. In a further effort to be conservative in our analysis, we have assumed that a total of six wells, including both vertical and horizontal, will be drilled in each square mile of 640 acres.

Our review of available data suggests that the Marcellus development in Pennsylvania is at too early a stage to provide information on more than initial well rates, reserve potential, and operating practices. Therefore, we have elected to use the Perryman study based on the Barnett shale in Texas as the most appropriate source of economic impact data for our use in estimating that impact in New York State. Production of the Barnett commenced in 1999 and has now shown more than 10 years of operational and economic history. Although there are obvious differences between the Barnett area near, and in the vicinity of Ft. Worth, and our New York development area, there are several similarities.

The Barnett area was at a fairly low economic level when development began, employment opportunities were modest, and municipal budgets were quite restricted. The State and local tax systems are similar to what appears to be close to the evolving tax structure that will govern natural gas development and production in New York State. We, therefore, believe that the Barnett experience is appropriate for use in forecasting the potential economic uplift of New York Marcellus-Utica development.

In using data from the Barnett experience, we have employed essentially the same methodology used by Dr. Timothy W. Kelsey in his forecast of the economic impact of Marcellus shale development in Pennsylvania. In early 2008, the Perryman Group prepared a study of the economic impact of the Barnett Shale on Fort Worth and the surrounding area. At the time of that analysis a total of 7,170 gas wells had been drilled and connected for gas sales within the Barnett Core, Tier 1 and Tier 2 areas. The findings from their study should provide reasonable approximations of potential economic impacts in New York State, especially in the areas with extensive natural gas development. Perryman reported at that time that the Barnett shale accounted for an estimated $8.2 billion in annual output. Perryman is saying, in effect, that for each 1000 of the 7,170 wells drilled, completed, and turned into the sales line, $1.14 billion of annual economic uplift was achieved. With our forecast of successful wells in New York State, we are using this factor to project potential economic uplift here in New York. See Table 1.

Table 1 The Current Annual Impact of All Major Sources of Stimulus Associated with the Barnett Shale on Business Activity in the Barnett Shale Region

Detailed Industrial Category

Source: Adapted from Perryman Group, 2008, Table 7

	Gross Product		Personal Income		Employment	
	Total	Percent	Total	Percent	Total	Percent
Agricultural Products & Services	56,888,599	1	38,743,790	1	541	1
Crude Petroleum & Natural Gas	2,201,107,991	27	1,015,147,454	21	5,625	7
New Construction	601,020,851	7	495278931	10	7,886	9
Maintenance & Repair Construction	438,101,459	5	361,023,204	7	5,535	7
Food Products & Tobacco	59,126,567	1	30,203,815	1	474	1
Printing & Publishing	44,783,369	1	29,230,712	1	419	0
Chemicals & Petroleum Refining	42,159,245	1	19,795,329	0	122	0
Fabricated Metal Products	113,957,330	1	73,571,619	2	1,345	2
Machinery, Except Electrical	41,207,018	1	29,438,996	1	327	0
Transportation	285,689,717	3	188,945,917	4	2,497	3
Communication	125,864,102	2	53,735,597	1	400	0
Electric,Gas,Water,Sanitary Serv.	141,588,601	2	61,785,346	1	178	0
Wholesale Trade	272,376,413	3	157,054,268	3	1,755	2
Retail Trade	1,317,009,628	16	787,530,330	16	23,030	27
Finance	127,983,892	2	74,525,729	2	615	1
Insurance	89,310,082	1	53,392,505	1	576	1
Real Estate	422,441,645	5	68,064,005	1	606	1
Hotels,Lodges,Amusements	72,165,676	1	47,342,655	1	1,177	1
Personal Services	205,575,691	3	159,941,609	3	2,836	3
Business Services	349,613,818	4	285,195,936	6	3,635	4
Eating & Drinking Places	460,215,268	6	244,860,022	5	12,318	15
Health Services	324,897,998	4	274,705,668	6	4,890	6
Miscellaneous Services	192,991,345	2	167,306,704	3	4,148	5
All Other Small Categories	222,713,203	1	137,253,976	2	2,888	4
Total	8,208,789,508		4,854,074,117		83,823	

Cumulative Wells Completed	7,170
Uplift Factor Per 1000 Wells$Billions	1.14

As will be noted from a review of Table 1, the Perryman Group prepared a detailed analysis of economic activity flowing from the drilling of those 7,170 Barnett wells on the production of goods and services in Ft. Worth and the surrounding area. It will be observed that for each category of product and service, they have estimated the Gross Product, Personal Income and direct Employment attributable thereto. The Barnett drilling, and the economic effect upon Ft. Worth and vicinity, provide the best data available for approximating what will happen in NY State. Obviously, the experience in drilling Marcellus and Utica wells in New York State is not going to track exactly what has occurred in Ft. Worth and vicinity, but it should provide a reasonable measure of what can be expected. Actually, we are of the opinion that Marcellus-Utica development in New York will provide a greater uplift than was experienced in the Ft. Worth area. First off, our wells on average could prove to be more prolific because we have both Marcellus and Utica formations as the basis for well completions. In many cases, our individual wells will be producing from both the Marcellus and the Utica. In most of our areas, we do not have the already established commercial infrastructure of Ft. Worth before drilling is initiated, and, therefore, creation of this infrastructure and full development of the areas will create a greater economic uplift. Employment opportunities in our areas are at a very low level, while in Ft. Worth a more vibrant economy was providing better opportunities than in our NY areas even before the Barnett drilling began.

In order to relate to the Barnett experience we have prepared the following Table 2 which sets forth the previously described information from NY counties expressed in square miles and carried through to assumptions of successful drilling at levels of 80%, 70%, and 60%. These successful levels have then been related to actual wells drilled through the conservative assumption of 6 wells per square mile. We have then applied the economic uplift factor from the Perryman study to project economic uplift that could be expected from the total wells that would be drilled under the success levels of 60 to 80 percent. Even at the lowest assumed success level of 60%, we arrive at an Annual Economic Uplift of $92 billion.
See Table 2.

Table 2 ECONOMIC UPLIFT FROM NATURAL GAS DEVELOPMENT

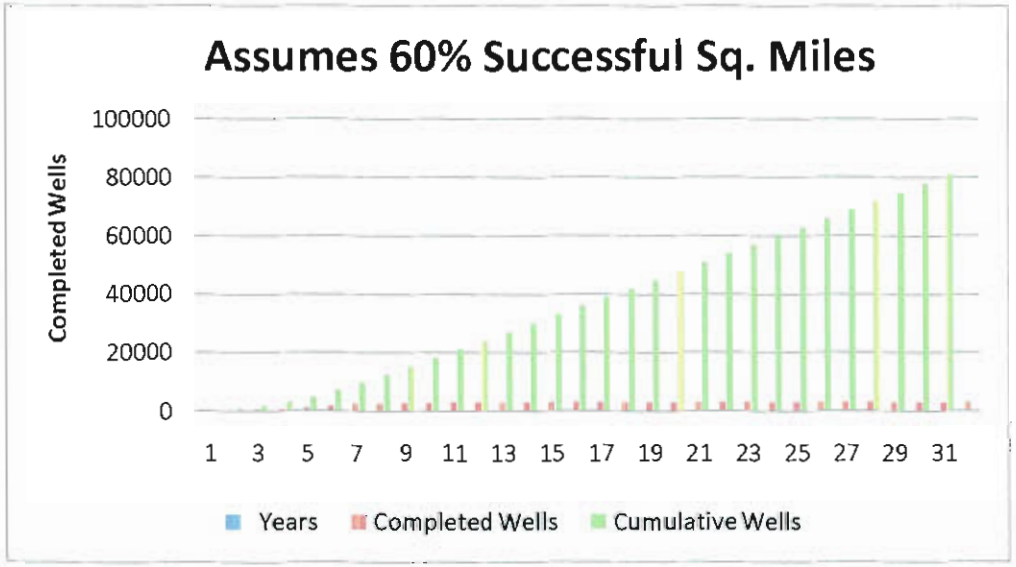
		POTENTIAL	TERRAIN	80%	70%	60%
	TOTAL	PRODUCIVE	AVAILABLE	SUCCESSFUL	SUCCESSFUL	SUCCESSFUL
COUNTIES	SQUARE	SQUARE	SQUARE	SQUARE	SQUARE	SQUARE
	MILES	MILES	MILES	MILES	MILES	MILES
Broome	715	700	630	504	441	378
Chenango	899	850	765	612	536	459
Madison	662	600	540	432	378	324
Oswego	1312	1,000	900	720	630	540
Lewis	1290	500	450	360	315	270
Oneida	1213	700	630	504	441	378
Cortland	502	500	450	360	315	270
Onondaga	806	800	720	576	504	432
Tioga	523	500	450	360	315	270
Tompkins	476	450	405	324	284	243
Cayuga	864	850	765	612	536	459
Wayne	1384	600	540	432	378	324
Seneca	325	300	270	216	189	162
Schuyler	342	300	270	216	189	162
Chemung	411	400	360	288	252	216
Steuben	1404	1,400	1,260	1,008	882	756
Yates	376	350	315	252	221	189
Ontario	662	650	585	468	410	351
Monroe	1366	650	585	468	410	351
Orleans	817	350	315	252	221	189
Genesee	495	450	405	324	284	243
Livingston	640	600	540	432	378	324
Allegany	1034	1,000	900	720	630	540
Wyoming	596	550	495	396	347	297
Niagara	1140	500	450	360	315	270
Erie	1227	1,000	900	720	630	540
Cattaraugus	1310	1,300	1,170	936	819	702
Chautauqua	1500	1,050	945	756	662	567
Herkimer	1458	150	135	108	95	81
Otsego	1003	1,000	900	720	630	540
Delaware	1468	1,450	1,305	1,044	914	783
Sullivan	997	950	855	684	599	513
Schoharie	626	550	495	396	347	297
Albany	533	500	450	360	315	270
Greene	658	500	450	360	315	270
Ulster	1161	800	720	576	504	432
Orange	839	200	180	144	126	108
Totals	33,034	25,000	22,500	18,000	15,750	13,500
			Productive			
			Wells@6/sqmi	108,000	94,500	81,000
From Perryman Study Annual Economic Impact						
for every 1000 wells equals 1.14 billion dollars.						
			Total Annual			
			Economic			
			Uplift-$Billion	123	108	92

We recognize that these forecast figures on economic uplift for NY State may raise some eye brows among those conditioned to our rather stagnant economy, but they are believable when viewed in the context of the Ft. Worth experience. In Exhibits D-1, D-2, and D-3 attached to this analysis are compilations of information on Barnett drilling by the Texas Railroad Commission that oversees oil and gas drilling and production activities in Texas. Those exhibits shows that as of February of this year 13,740 wells have been drilled in the Barnett with the field area now expanded to 23 counties from the original 3 core counties and 11 Tier 1 and Tier 2 counties. There will soon be another update by Perryman, and it can be expected that the new annual economic uplift figures from Ft. Worth and vicinity will be about $16 billion, and development is not even close to being completed.

Exhibit E-3 provides a progression of cumulative wells and cumulative natural gas reserves in the Barnett over the period from 1993 to 2009. Using a similar format, we have projected in the following Tables 3A, 3B, and 3C the profile of wells drilled, and cumulative wells versus time in years for our cases of assumed 60%, 70% and 80% drilling success rates. Thereafter we have applied the $1.14 billion uplift factor from Table 2 to project economic uplift versus cumulative wells for natural gas development in NY State. As will be observed, even if only the 60% percent level becomes reality, New York State will become a very significant producer of natural gas and will, also, become a much more prosperous State.
See Tables 3A, 3B, and 3C.

60% SUCCESSFUL CASE

Years	Completed Wells	Cumulative Wells	Cumulative Annual Uplift $ Billion
1	150	150	0.2
2	300	450	0.5
3	500	950	1.1
4	800	1750	2.0
5	1200	2950	3.4
6	1700	4650	5.3
7	2500	7150	8.2
8	2600	9750	11.1
9	2700	12450	14.2
10	2800	15250	17.4
11	2900	18150	20.7
12	2900	21050	24.0
13	2900	23950	27.3
14	3000	26950	30.7
15	3000	29950	34.1
16	3000	32950	37.6
17	3000	35950	41.0
18	3000	38950	44.4
19	3000	41950	47.8
20	3000	44950	51.2
21	3000	47950	54.7
22	3000	50950	58.1
23	3000	53950	61.5
24	3000	56950	64.9
25	3000	59950	68.3
26	3000	62950	71.8
27	3000	65950	75.2
28	3000	68950	78.6
29	3000	71950	82.0
30	3000	74950	85.4
31	3000	77950	88.9
32	3000	80950	92.3



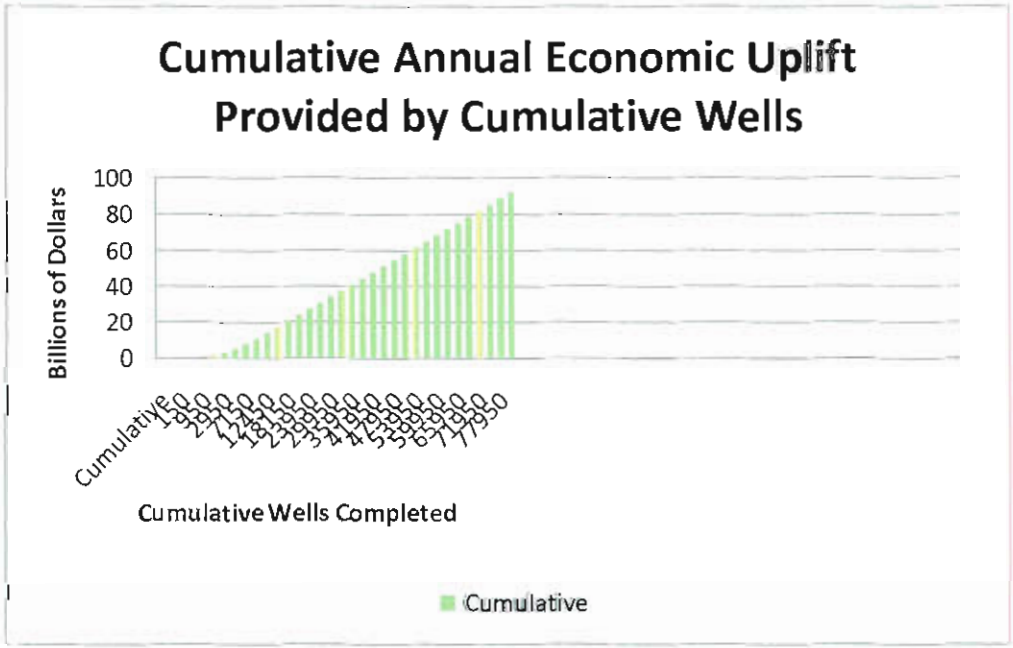
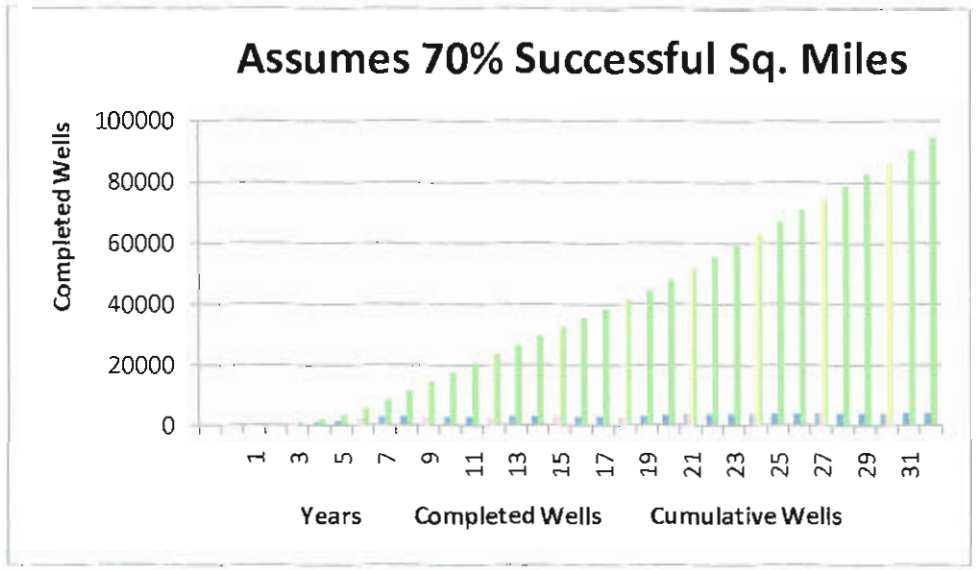


TABLE 3B

70% SUCCESSFUL CASE

Years	Completed Wells	Cumulative Wells	Cumulative Annual Uplift $ Billion
1	150	150	0.2
2	300	450	0.5
3	600	1050	1.2
4	1000	2050	2.3
5	1500	3550	4.0
6	2100	5650	6.4
7	2800	8450	9.6
8	3000	11450	13.1
9	3000	14450	16.5
10	3000	17450	19.9
11	3000	20450	23.3
12	3000	23450	26.7
13	3000	26450	30.2
14	3000	29450	33.6
15	3000	32450	37.0
16	3000	35450	40.4
17	3000	38450	43.8
18	3000	41450	47.3
19	3000	44450	50.7
20	3400	47850	54.5
21	3800	51650	58.9
22	3800	55450	63.2
23	3800	59250	67.5
24	3800	63050	71.9
25	3800	66850	76.2
26	3800	70650	80.5
27	4000	74650	85.1
28	4000	78650	89.7
29	4000	82650	94.2
30	4000	86650	98.8
31	4000	90650	103.3
32	4000	94650	107.9



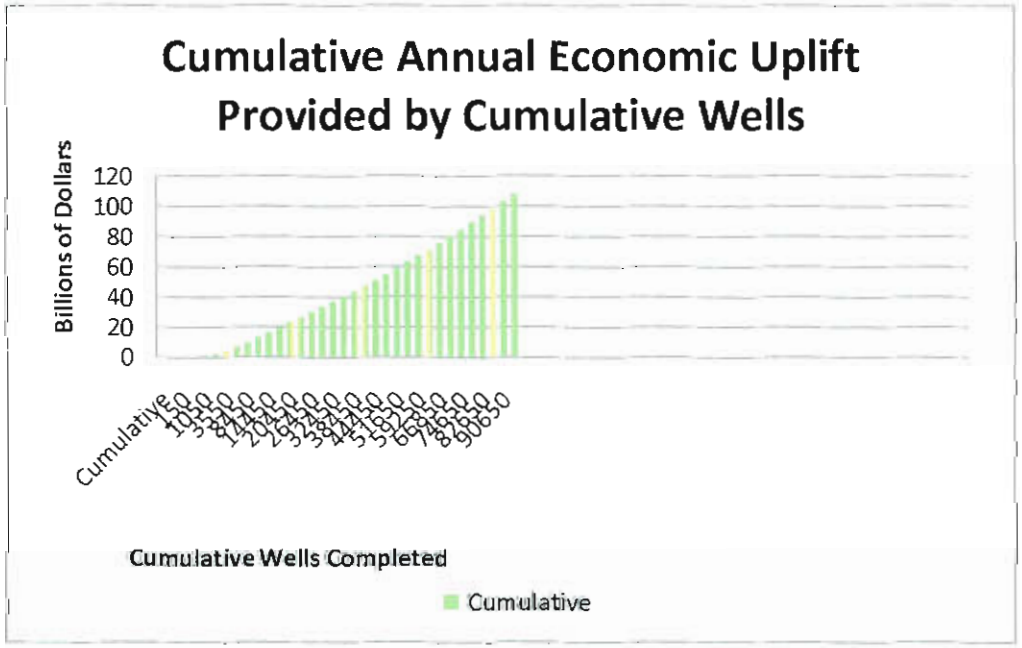
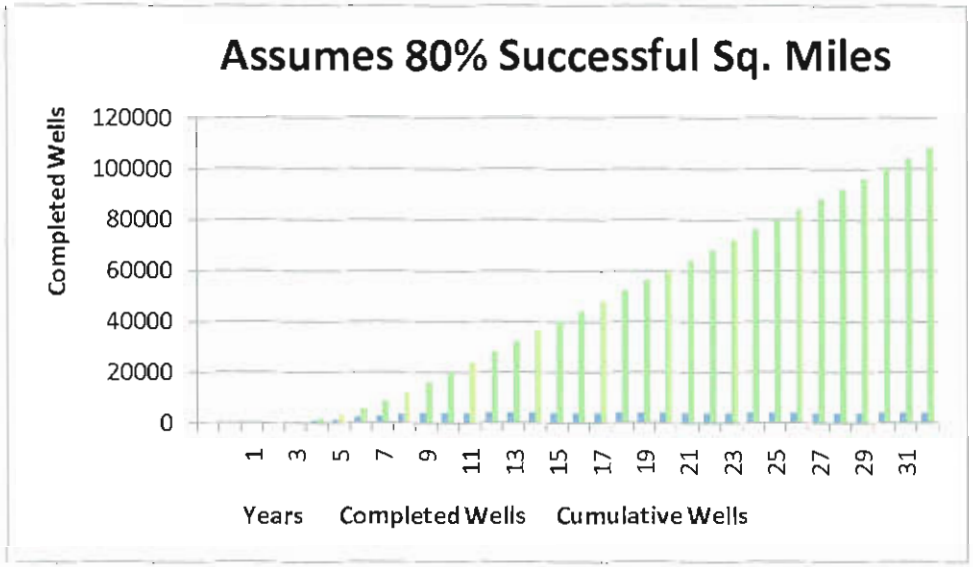
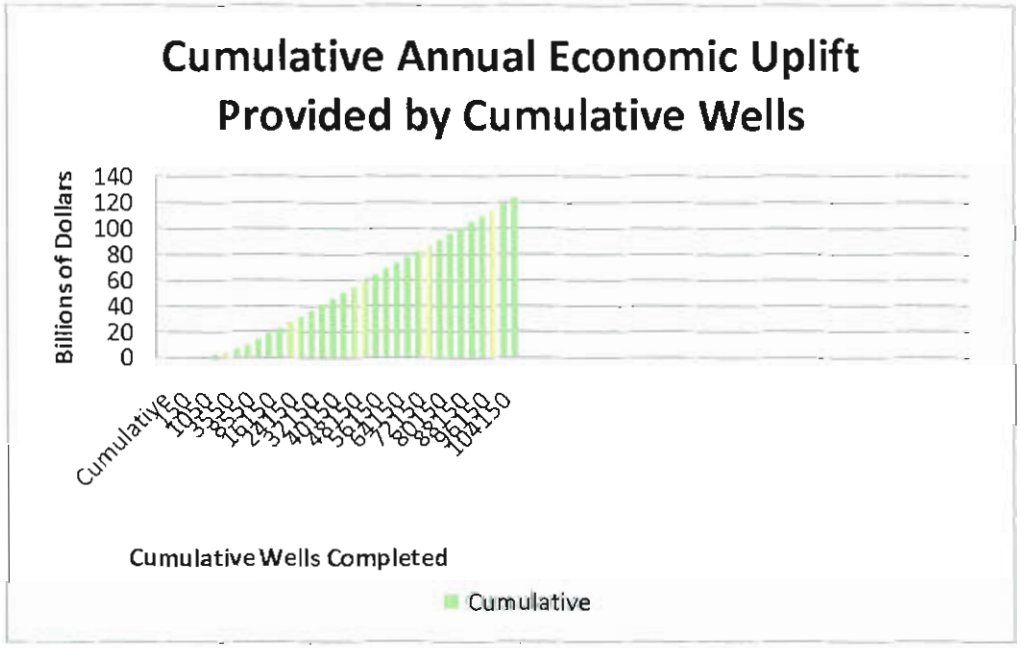


TABLE 3C

80% SUCCESSFUL CASE

Years	Completed Wells	Cumulative Wells	Cumulative Annual Uplift $ Billion
1	150	150	0.2
2	300	450	0.5
3	600	1050	1.2
4	1000	2050	2.3
5	1500	3550	4.0
6	2200	5750	6.6
7	2800	8550	9.7
8	3600	12150	13.9
9	4000	16150	18.4
10	4000	20150	23.0
11	4000	24150	27.5
12	4000	28150	32.1
13	4000	32150	36.7
14	4000	36150	41.2
15	4000	40150	45.8
16	4000	44150	50.3
17	4000	48150	54.9
18	4000	52150	59.5
19	4000	56150	64.0
20	4000	60150	68.6
21	4000	64150	73.1
22	4000	68150	77.7
23	4000	72150	82.3
24	4000	76150	86.8
25	4000	80150	91.4
26	4000	84150	95.9
27	4000	88150	100.5
28	4000	92150	105.1
29	4000	96150	109.6
30	4000	100150	114.2
31	4000	104150	118.7
32	4000	108150	123.3





Referring back to Table 1, it will be noted that Perryman derived a new employment figure of 83,823 based upon 7,170 wells or almost 11,700 new jobs for every 1000 Barnett wells drilled and completed. We should be able to generate the same level of employment, if not more, from drilling the Marcellus and Utica shales in New York State. Using our minimum case of 60% successful acreage, we could expect new employment of over 800,000 new jobs over a 30 year period. We need those jobs if we are to keep our young people here in New York as they enter the job market.

A close examination of the assumptions in this study will reveal a strong bias toward the conservative side. For example our conservative projections of producing rates and ultimate natural gas recoveries do not even consider the very substantial gains available from the use of multiple laterals, infill drilling and refracing declining producing wells. But even with the use of conservative assumptions, the results clearly demonstrate a sea changing opportunity for economic revitalization of the State economy and employment picture. These results should be viewed as very conservative, and this opportunity should be viewed as huge.

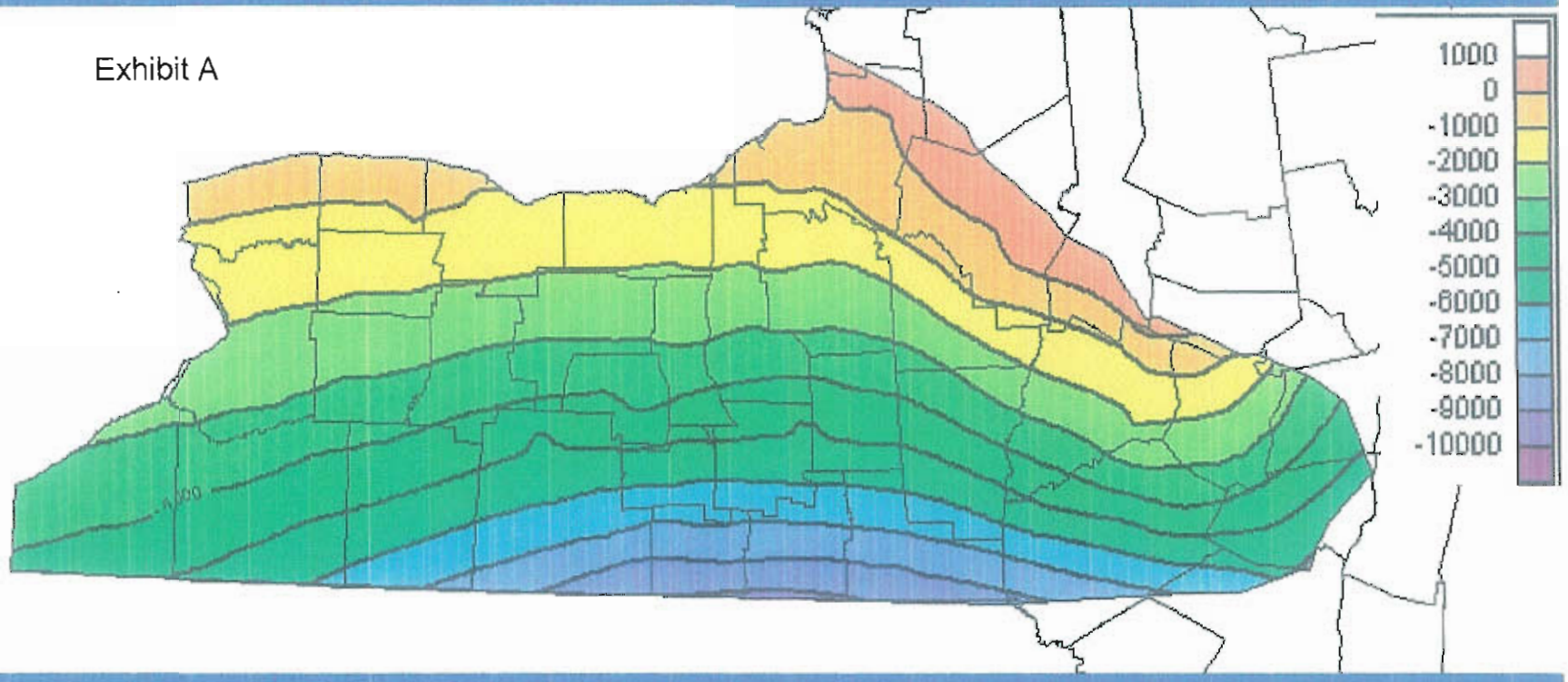
STUDY OF THE POTENTIAL ECONOMIC UPLIFT FROM MARCELLUS AND UTICA SHALE WELL NATURAL GAS DEVELOPMENT IN NEW YORK STATE

EXHIBITS

Exhibit A	Utica Shale Contour Map for New York State From Reservoir Characterization Group-New York State Museum
Exhibit B	Marcellus Shale Contour Map for New York State From Reservoir Characterization Group-New York State Museum
Exhibit C	Marcellus-Utica Shales Sweet Spot Overlap From Reservoir Characterization Group-New York State Museum
Exhibit D-1	Barnett Well Statistics Texas Railroad Commission Records
Exhibit D-2	Barnett Production & Permits Texas Railroad Commission Records
Exhibit D-3	Barnett Drilling & Reserves Profile Texas Railroad Commission Records

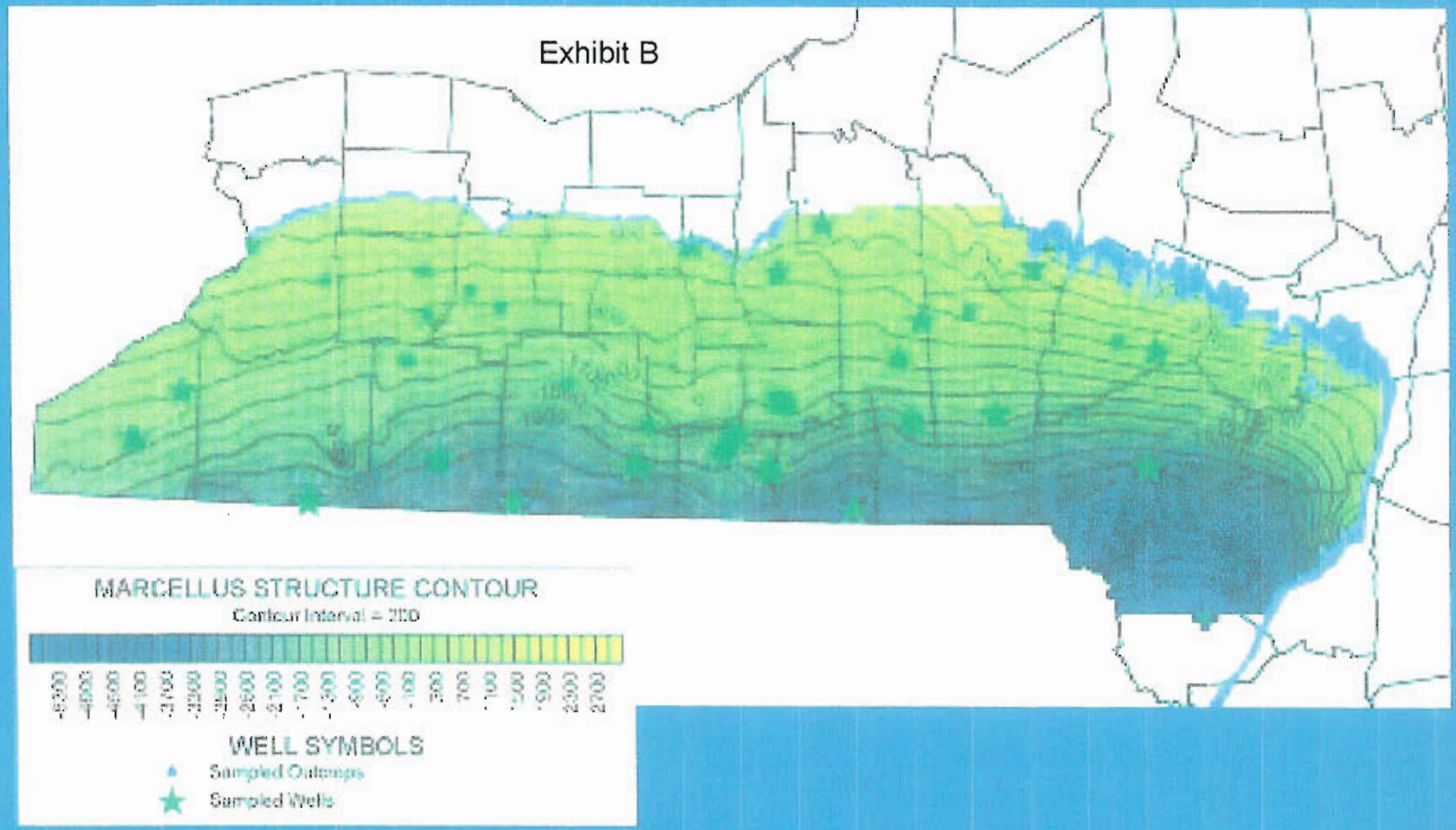
Utica Structure Contour Map

Exhibit A



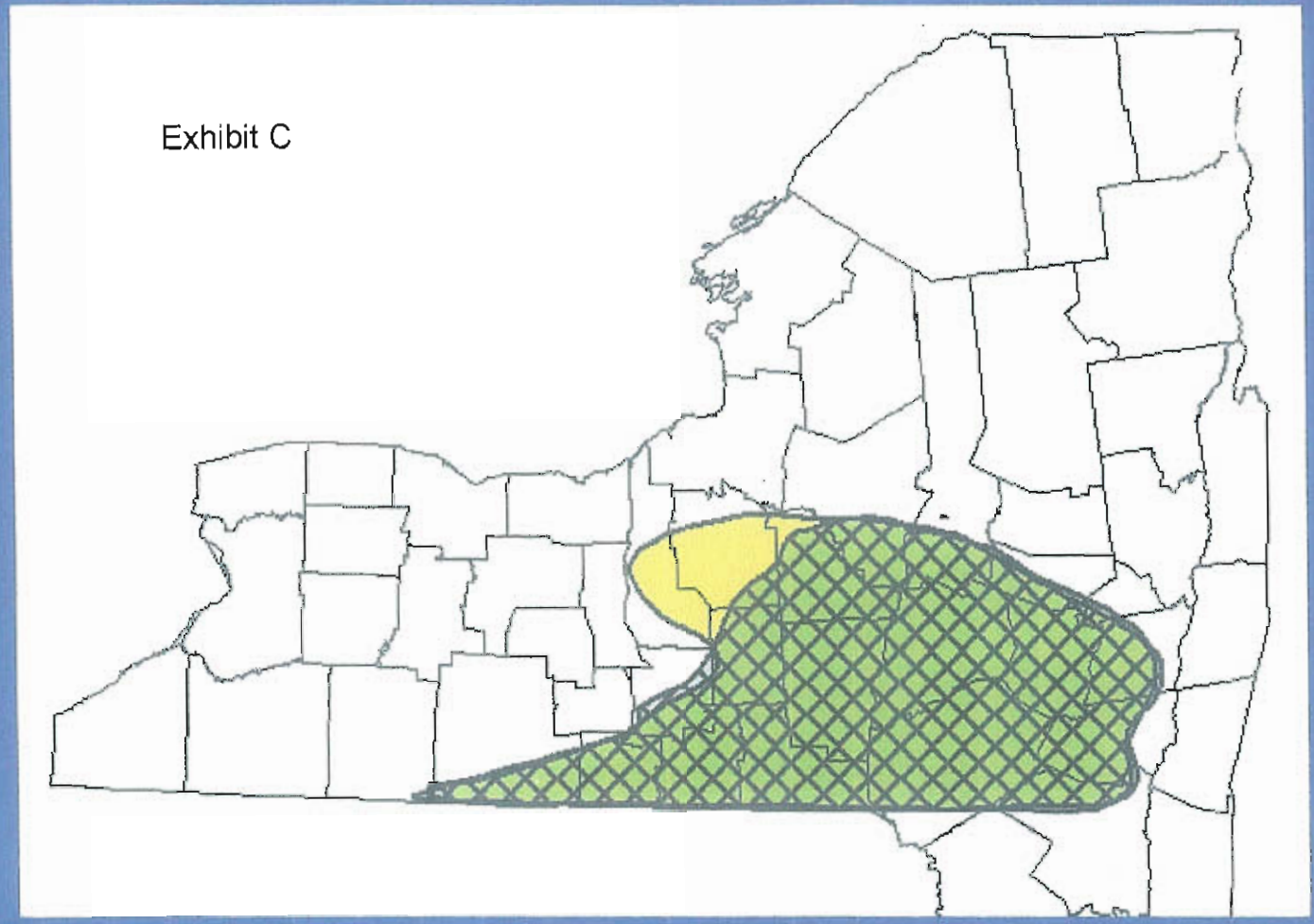
Utica gets deeper to the south

Marcellus Structure Contour Map



Marcellus has a general east-west strike is gently dipping south

Utica and Marcellus fairways



They overlap in eastern side of basin

Exhibit D-1

Newark, East (Barnett Shale) Field
Discovery Date – 10-15-1981

- **As of February 25, 2010 there are a total of gas wells 13,740 entered on RRC records.**
  In addition, there are 3,273 permitted locations (represents pending oil or gas wells, where either the operator has not yet filed completion paperwork with the Commission, or the completed well has not yet been set up with a Commission identification number).

- **In 2009 there were a total of 136 injection wells and commercial saltwater disposal wells on our records, and 24 disposal permits were issued.**

- **This field produces in twenty three (23) counties: Archer, Bosque, Clay, Comanche, Cooke, Coryell, Dallas, Denton, Eastland, Ellis, Erath, Hill, Hood, Jack, Johnson, Montague, Palo Pinto, Parker, Shackelford, Somervell, Stephens, Tarrant, and Wise. In addition, drilling permits have been issued for wells in Hamilton.**

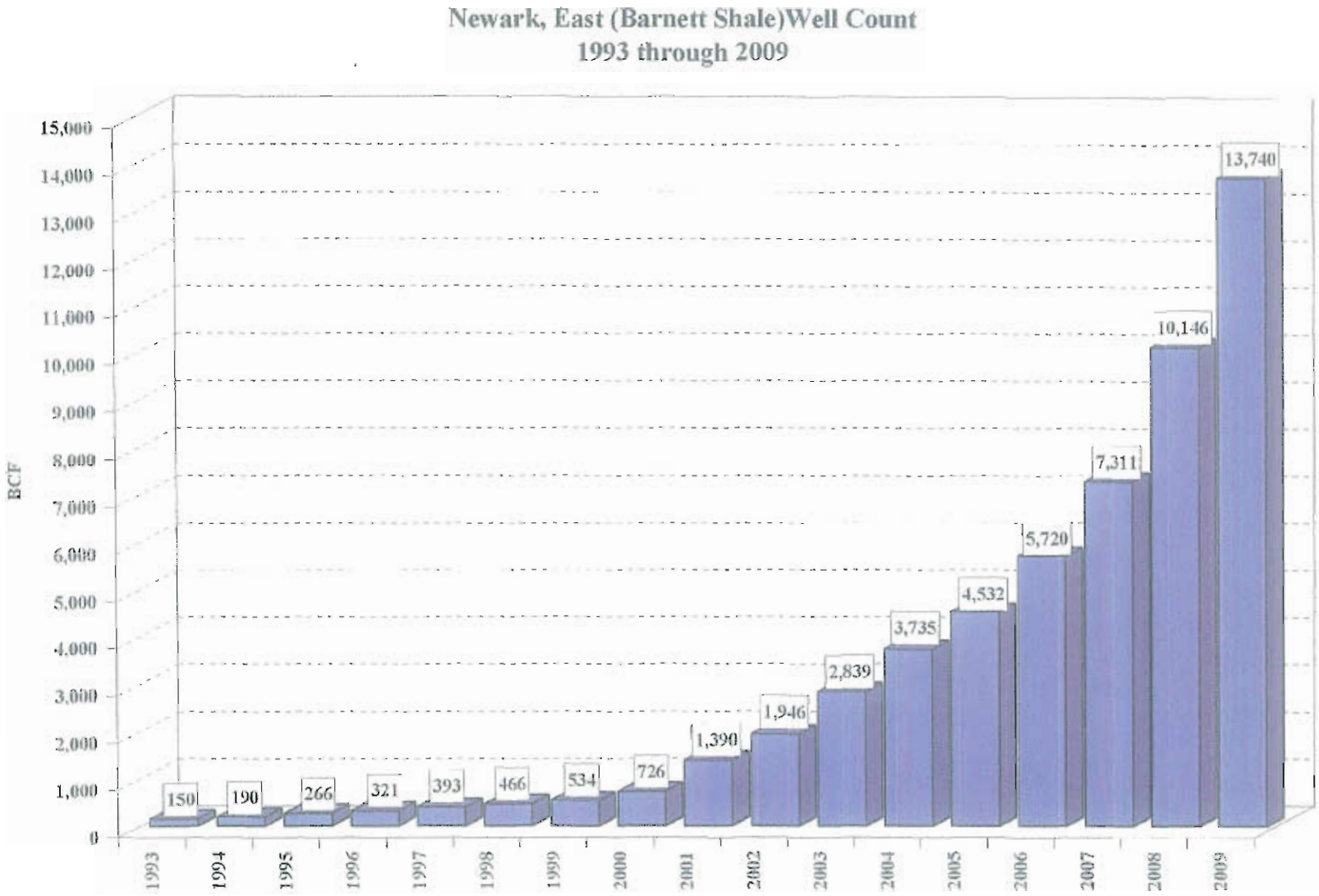
- **Gas Well Gas Production –**
  January 2004 through December 2004 = 380 Bcf
  January 2005 through December 2005 = 503 Bcf
  January 2006 through December 2006 = 712 Bcf
  January 2007 through December 2007 = 1,082 Bcf
  January 2008 through December 2008 = 1,563 Bcf
  January 2009 through December 2009 = 1,764 Bcf

- **For January through December 2009 production accounts for 26% of Texas Production**

- **Drilling Permits Issued –**
  January 2004 through December 2004 = 1,112
  January 2005 through December 2005 = 1,629
  January 2006 through December 2006 = 2,503
  January 2007 through December 2007 = 3,643
  January 2008 through December 2008 = 4,145
  January 2009 through December 2009 = 1,755

- **There are a total of 246 operators in the Newark, East (Barnett Shale) Field.**

Exhibit D-3


Newark, East (Barnett Shale)Well Count
1993 through 2009
BCF
15,000
14,000
13,000
12,000
11,000
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
150
190
266
321
393
466
534
726
1,390
1,946
2,839
3,735
4,532
5,720
7,311
10,146
13,740
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009

Petro Enterprises is an international oil and gas consulting firm founded by David W. Keefe. The firm has been active in consulting work with major and independent oil and gas firms in the US and in Europe, Africa, South America, the Middle East and in Japan, Indonesia and Australia.

Mr. Keefe is a Petroleum Engineer with a degree from the University of Pittsburgh, Magna Cum Laude and an MBA degree from New York University. After graduation from the University of Pittsburgh he was employed by what is now the ExxonMobil Corporation. After earning his retirement from Mobil, he founded Petro Enterprises. Mr. Keefe has more than 50 years of experience in the Petroleum Industry. He owns acreage in New York State and is active in the formation and administration of acreage coalitions in the State.