

MINUTES OF THE Senate COMMITTEE ON Energy and Natural Resources

The meeting was called to order by Senator Charlie L. Angell at  
Chairperson

8:00 a.m./~~PM~~ on Tuesday, February 14, 1984 in room 123-S of the Capitol.

All members were present ~~XXXXX~~

Committee staff present:

Ramon Powers, Research Department  
Raney Gilliland, Research Department  
Don Hayward, Revisor's Office

Conferees appearing before the committee:

Kurt H. Wulff, Donaldson, Lufkin & Jenrette

Kurt Wulff summarized his analysis, "Rediscovering Hugoton: Recommendation for Kansas". He recommends that the State Corporation Commission permit infill drilling in the Hugoton Field and says this will create 2 billion dollars of new wealth for the state and its citizens. Mr. Wulff pointed out these new wells would be at a much higher price, probably \$2.80 to \$3.00, and even with the average of the old wells of something like 50¢, the total average for the field would be somewhere around \$2.00. He explained how he calculated his volume and price projections. He discussed the competitive aspect of oil with natural gas. Answering a question from Senator Hess, Mr. Wulff said that the normal evolution of a large gas field is to gradually denser spacing. He pointed out the money spent for drilling these new wells would be an added boost for the Kansas economy. Responding to Chairman Angell's question about the comparison between infill drilling and no infill drilling, Mr. Wulff said the volume of 8 trillion cubic feet might be somewhat lower but the price projections would be much lower, and he would estimate the non-infill case to be less than 20% of the infill case. He agreed that his analysis is strictly an economic analysis without regard to the pressure of the reservoir. Senator Kerr asked about the other side of the picture. Mr. Wulff said there's a possible feeling by the gas companies that there's no need for infill drilling, that Kansas Power and Light may object that the impact to them is not minimal and that the perception of the general public that any higher wellhead prices cannot be tolerated are all concerns that could work against the case for infill drilling. Senator Feleciano asked about clarification of the impact on Kansas Power and Light Company. Mr. Wulff said that Kansas Power and Light Company's share of the field is only 7%, and that the contract for 78% of their gas at 28¢ expires in 1989. He emphasized that the economic benefits to the state far outweigh any possible adverse effects to Kansas Power and Light Company. He stated that decontrol is even more advantageous for Kansas than infill drilling. Chairman Angell asked why, when production already exceeds demand, would it do any good to increase the production capacity even further. Mr. Wulff answered that he expects supply and demand to be in balance in about two years and stressed that infill drilling will take several years to implement. Answering questions from Senator Chaney about decontrol, Mr. Wulff said that, on a short term basis, gas production earnings from large companies ought to be a little higher, but the economic efficiency will increase. He feels that decontrol of gas would put pressure on international oil prices.

Chairman Angell thanked Mr. Wulff for coming to testify before the Committee. The next meeting of the Committee will be at 8:00 a.m on Wednesday, February 15, 1984.

(Copies of Mr. Wulff's bulletin ("Rediscovering Hugoton") and a transcript of the tape made at the meeting are attached).

SENATE  
ENERGY AND NATURAL RESOURCES  
~~AGRICULTURE AND SMALL BUSINESS COMMITTEE~~

8:00 a.m., Room 123-S  
10:00 a.m., Room 423-S

2/14/84  
Date

NAME	ADDRESS	ORGANIZATION
David W. Nickel	<del>TOP</del>	KCC
<del>Alman</del>	<del>RP22nd</del>	<del>Self</del>
Ed Reinert	Topeka	Ks League of Voters
George A. Sims	Hogerton	Mob. 1
W.L. Robertson	Kansas City	Panhandle Eastern
Paul Johnson	Topeka	PACK
Jim McBride	Topeka	United Way of Topeka
Doug Smith	Topeka	Attorney General's Office
Don Schnacker	Topeka	KIOGA
Hannah H. Stasser	NY	Donaldson, Kiffin & Lawrence
James W. Collins	Cities Service Oil & Gas Corp	Tulsa OKLA
Spurlock C. Byrd	Ottawa Kans	Interstate Oil Compact Comm
Joe Hedges	TOCSA	Cities Service Oil & Gas Corp.
Richard D. Kready	Topeka	KPL / Gas Service Co.
Tom Sloan	Lawrence	GETTY
Shelby Smith	Wichita	LAWSON
Chip Wheelen	Topeka	Ks Legis. Policy Group
Charles V. Hamm	Zoo Field - Topeka	Kans Dept of H & E
Steve Watson	Topeka	Kansas Farmer magazine
BARRY C. RIST	K.C. MO	PANHANDLE EASTERN
JIM W. MOGG	K.C. MO	PANHANDLE EASTERN
Penny Plamann	Topeka	KIOGA
Lon Stanton	Topeka	Norther National Gas
D.S. Black	Topeka	KPL / Gas Service
BILL PERDUE	"	" "

Ed Peters  
Jack Graves

Wichita

KCS  
Panhandle Eastern

## Research Bulletin

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### REDISCOVERING HUGOTON

#### Recommendation for Kansas

##### Summary and Recommendation

We recommend that the citizens of Kansas urge their State Corporation Commission to permit infill drilling in the Hugoton gas field to create \$2 billion of new wealth today for the state and its citizens without increasing the cost of gas to consumers in Kansas by any meaningful amount. Federal natural gas regulations are stripping Kansas of its energy resource birthright. As long as such controls remain in place, the state's most attractive alternative is to authorize the drilling of more wells whose production is eligible for a near market price about five times that from existing wells. The benefits to the state are assured by a severance tax passed in the spring of this year. Until now most of the local political sentiment has been opposed to actions that seem so clearly in the long-term best interests of the state. Having recently analyzed this issue from the investment research point of view, we think that the conclusions merit the attention of opinion leaders and policy makers in Kansas as well that of our investor clients.

1. *Export gas cheap, repurchase dear.* Ninety percent of the production from the largest natural gas field in the U.S. is purchased by federally regulated interstate pipelines at an average price of only one fifth its current value. No government entity anywhere in the world allows so much high-quality energy supply to be exported at such low prices. Compounding the folly, Kansas imports natural gas for its own requirements at prices five times what it receives for producing the same commodity.
2. *Kansas can change production regulations.* To redress this gross inequity, the state can modify the rules in the Hugoton gas field to allow a doubling in the number of wells. Production from new wells is eligible for a near-market price under existing federal regulations.
3. *The consumers are the producers!* Only a few months ago, Governor Carlin signed the severance tax reserving 8% of wellhead revenue for Kansas. Drilling 4,000 new wells would increase future revenues for the Hugoton field by about \$60 billion through the year 2020. The state of Kansas would keep almost \$5 billion of the increment with the severance tax, nearly \$3 billion with the state income tax, and local residents would earn about \$6 billion more mainly from royalties. Those future benefits of \$14 billion are worth more than \$2 billion in present value after discounting for the time value of money.

4. *Pipeline suppliers use Hugoton to subsidize less economic sources.* Almost none of the low price old gas is delivered directly to Kansas users. Nearly all is obscured with high price supply from other sources such that the end users pay a delivered price that bears no resemblance to the wellhead price in Hugoton. Thus, higher wellhead prices for Hugoton gas would not necessarily translate to higher delivered prices for Kansas consumers.

An attached analysis of the economics and politics of the Hugoton field is extracted from one of our regular oil and gas investment research publications (see *U.S. Wildcat Profiles*, "Rediscovering Hugoton," August 1983).

Kurt H. Wulff

## Hugoton Rediscovery Value More Than \$5 Billion

Estimated reserves in the Kansas Hugoton gas field exceed 8 trillion cubic feet on the basis of reports by pipeline companies to the Kansas Corporation Commission. Those reserves remain after the field has already produced some 16 trillion cubic feet. Until 1980, the Hugoton field alone provided more than 2% of total U.S. natural gas supply. Dividing 1982 production of a little more than 200 bcf into reserves results in a life index of 40 years. The life index will be almost 50 years at expected 1983 production! Annual volumes are likely to rebound two to three times from the 1983 low considering that actual production in 1978 was more than 550 bcf (See Table 1).

After volume, price is the next variable in analyzing value. Natural gas decontrol as proposed in the bill just endorsed by the U.S. Senate Energy Committee would result in the most price appreciation during the next few years. While the odds we place on the adoption of such legislation are 50%, few investors believe this. Even under our optimistic odds the risk that federal decontrol may not occur is substantial. That makes an alternate case more important. Without decontrol we think that the state of Kansas will authorize infill drilling within two years. A discussion of the political factors supporting this conclusion follows later. Drilling a second well for every square mile in more than 4,000 square miles of the Hugoton field would qualify for a higher price under existing controls. More than half of production would come from infill wells mainly because experience shows that the pressure of new wells is higher than that for existing wells for several years. Even if infill drilling is postponed, there is a gradual replacement of old wells that fail. Replacement wells qualify for a higher price after 1985. Infill drilling will be authorized in any event when capacity of the field declines to demand. Such an occurrence is inevitable before the field is fully depleted.

Oil-price escalation is likely to be higher than otherwise if there is no natural gas decontrol because regulations will tend to restrict the competitiveness of a major world energy source, U.S. natural gas. Oil prices are projected to escalate at 7% a year after a smaller increase in 1984. The industry average natural gas wellhead price is projected to reach 80% of the oil equivalent by the year 2000, and the Hugoton price reaches two-thirds of the industry average after infill drilling is completed in 1988 and then escalates to 80% of the natural gas average by the year 2000.

The discount rate used in the present value calculation is 12% rather than 15% that we normally use. On the other hand, price escalation rate is tied to long-term inflation at 7% per year, also lower than 10% that we have used previously.

The present-value calculation suggests that the "rediscovery value" of this large natural gas field is \$5,643 million, or almost \$6 billion in round numbers. That value gains more meaning when compared with the cost of acquiring these reserves otherwise known as "finding-and-development" costs when applied to new fields.

Table 1  
Kansas Hugoton Gas Field  
Present Value of Future Cash Flow

Year	Production (bcf)	Price (\$/mcf)	Revenue (\$mm)	Operating Costs (\$mm)	Capital Costs (\$mm)	Depletion (\$mm)	Income Tax (\$mm)	Cash Flow (\$mm)	Present Value (\$mm)
1983	160	\$0.60	96	23		48	12	60	60
1984	200	0.65	130	27		60	22	82	73
1985	240	0.70	168	31		72	33	105	83
1986	280	1.00	280	42	200	84	7	31	22
1987	320	2.00	640	79	300	109	121	140	89
1988	360	3.00	1080	123	400	122	277	280	159
1989	400	4.00	1600	175		136	645	781	395
1990	400	4.40	1760	191		136	717	853	386
1991	400	4.90	1960	211		136	806	942	381
1992	400	5.40	2160	231		136	896	1032	372
1993	400	6.00	2400	256		136	1004	1140	367
1994	400	6.60	2640	280		136	1112	1248	359
1995	400	7.30	2920	308		136	1238	1374	353
1996	365	8.10	2953	311		124	1259	1383	317
1997	331	9.00	2983	314		113	1278	1390	285
1998	301	10.00	3013	318		102	1296	1399	256
1999	274	11.10	3040	321		93	1313	1406	229
2000	249	12.20	3038	320		85	1316	1401	204
2001	226	13.10	2965	313		77	1287	1364	177
2002	206	14.00	2881	305		70	1253	1323	154
2003	187	14.90	2787	296		64	1214	1278	132
2004	170	16.00	2721	289		58	1187	1245	115
2005	155	17.10	2644	282		53	1155	1207	100
2006	141	18.30	2572	275		48	1125	1172	87
2007	128	19.60	2504	268		43	1096	1140	75
2008	116	21.00	2439	262		39	1069	1108	65
2009	106	22.40	2365	255		36	1037	1073	56
2010	96	24.00	2304	249		33	1011	1044	49
2011	87	25.70	2243	243		30	985	1015	42
2012	79	27.50	2182	237		27	959	986	37
2013	72	29.40	2120	231		25	933	957	32
2014	66	31.50	2065	226		22	909	931	28
2015	60	33.70	2009	220		20	884	904	24
2016	54	36.00	1951	214		18	859	877	21
2017	49	38.50	1897	209		17	835	852	18
2018	45	41.20	1845	204		15	813	828	16
2019	41	44.10	1795	199		14	791	805	14
2020	37	47.20	1747	195		13	770	782	12
Total	8000	\$9.86	78897	8533	900	2685	33525	35940	5643

### Hugoton Finding Costs Less Than \$3 Billion

Transactions whereby Hugoton properties change hands occur infrequently. A few years ago, Tenneco and Mesa in a joint venture acquired the Hugoton reserves of Ashland for some \$0.40 an mcf. The market for natural gas properties was stronger at that time, but even that level implies about \$3 billion for the whole field. The sponsor of legislation earlier this year in Kansas for the state to buy the Hugoton field estimated the cost between \$500 million and \$3 billion. While properties change hands infrequently, shares on the stock market trade every business day. The only issue concentrated exclusively on Hugoton gas, Dorchester Hugoton, has a stock market capitalization of less than \$30 million for 120 bcf of reserves (See Table 2). At \$0.20 an mcf, that puts a value on the whole field at less than \$2 billion. Similarly, only about \$140 million of KN Energy's stock market capitalization appears to be related to its nearly 500 bcf of Hugoton reserves suggesting a unit value of \$.30 an mcf. Perhaps 60% of Mesa Royalty Trust's stock market capitalization of more than \$400 million applies to its Hugoton reserves, suggesting a unit value of about \$.40 an mcf.

The low cost of acquiring Hugoton reserves contrasts with the cost of finding and developing new natural gas properties in recent years near \$1.50 an mcf. Reported costs compared with reserves added last year greatly exceeded this averaging over \$3 an mcf for eight natural gas pipelines (see *DLJ Industry Viewpoint*, "Natural Gas Pipelines, Buy the Resource-Rich Companies," July 14, 1983).

Moreover, the investment risks of acquiring Hugoton reserves are far lower than those associated with a new exploration program. The stock market value of Hugoton reserves reflects little more than the minimum that is almost sure to be realized under any foreseeable political outcome. The risk in an exploratory program is loss of the whole investment.

Table 2  
 Kansas Hugoton Gas Field  
 Stock Market Value of Natural Gas Reserves

	Dorchester Hugoton	KN Energy	Mesa Royalty Trust	Pandhandle Eastern
Stock price (\$/sh)	15	40	25	38
Shares (mm)	2	9	16	42
Market capitalization (\$mm)	27	340	410	1600
Attributable to Hugoton:				
Market cap (%)	100	40	60	10
Market cap (\$mm)	27	140	250	160
Reserves (bcf)	120	500	600	600
Life index-1983 (years)	30	25	35	40
Wellhead price-1983 (\$/m)	0.30	0.40	0.60	0.40
Market cap/reserves (\$/m)	0.20	0.30	0.40	0.30

Note: Hugoton amounts include Oklahoma for Dorchester and Panoma-Council Grove pool for KN and Mesa Royalty.

We next outline the reasons for our belief that the political risks in acquiring Hugoton gas are not as great as they seem.

### Economic Benefits to Kansas As Much As \$3 Billion

The most important political development in Kansas this year was the enactment of a severance tax of 8% on oil and gas wellhead revenue. Generating more than \$100 million a year, the tax made up a shortfall in the state's annual budget of \$1 billion. The need for new state revenues in a recession year overcame the opposition that had been successful in preventing enactment of a severance tax longer than in any other producing state. The debate on the tax paid little attention to its ultimate interaction with infill drilling in Hugoton. Nor do the congressmen and senators from Kansas who oppose federal decontrol acknowledge that with the severance tax the state gains more from higher wellhead prices than it gives up. Eight percent of incremental revenues flow directly to the state's coffers. In addition, a state income tax would gather in 5% more of incremental revenues. Finally, most of the landowners holding a one-eighth royalty on Hugoton production are residents of Kansas. Some of the working interest owners live in the state. We estimate that an additional 10% of wellhead revenues are retained by state residents. Thus, the state government and the residents of Kansas keep about 23% of incremental revenues from Hugoton gas production.

Along the lines of the calculation outlined earlier, the present value of future revenue that remains in Kansas amounts to almost \$3 billion. (See Table 3.) Even though the benefits of higher wellhead prices are substantial, the political emphasis so far has been entirely on the cost to Kansas residential consumers.



**Table 3**  
**Kansas Hugoton Gas Field**  
**Present Value to State of Kansas**  
**Infill Drilling Case**

Year	Production (bcf)	Price (\$/mcf)	Revenue (\$mm)	Severance		Income Tax (\$mm)	Cash Flow (\$mm)	Present Value (\$mm)
				Royalty (\$mm)	Tax (\$mm)			
1983	160	0.60	96	10	8	1	19	19
1984	200	0.65	130	13	10	2	26	23
1985	240	0.70	168	17	13	3	33	27
1986	280	1.00	280	28	22	1	51	36
1987	320	2.00	640	64	51	12	127	81
1988	360	3.00	1080	108	86	28	222	126
1989	400	4.00	1600	160	128	64	352	179
1990	400	4.40	1760	176	141	72	388	176
1991	400	4.90	1960	196	157	81	433	175
1992	400	5.40	2160	216	173	90	478	173
1993	400	6.00	2400	240	192	100	532	171
1994	400	6.60	2640	264	211	111	586	169
1995	400	7.30	2920	292	234	124	649	167
1996	365	8.10	2953	295	236	126	657	151
1997	331	9.00	2983	298	239	128	665	136
1998	301	10.00	3013	301	241	130	672	123
1999	274	11.10	3040	304	243	131	679	111
2000	249	12.20	3038	304	243	132	678	99
2001	226	13.10	2965	297	237	129	662	86
2002	206	14.00	2881	288	230	125	644	75
2003	187	14.90	2787	279	223	121	623	65
2004	170	16.00	2721	272	218	119	608	56
2005	155	17.10	2644	264	211	115	591	49
2006	141	18.30	2572	257	206	112	575	42
2007	128	19.60	2504	250	200	110	560	37
2008	116	21.00	2439	244	195	107	546	32
2009	106	22.40	2365	237	189	104	529	28
2010	96	24.00	2304	230	184	101	516	24
2011	87	25.70	2243	224	179	99	502	21
2012	79	27.50	2182	218	175	96	489	18
2013	72	29.40	2120	212	170	93	475	16
2014	66	31.50	2065	207	165	91	463	14
2015	60	33.70	2009	201	161	88	450	12
2016	54	36.00	1951	195	156	86	437	10
2017	49	38.50	1897	190	152	84	425	9
2018	45	41.20	1845	185	148	81	413	8
2019	41	44.10	1795	180	144	79	402	7
2020	37	47.20	1747	175	140	77	391	6
<b>Total</b>	<b>8000</b>	<b>9.86</b>	<b>78897</b>	<b>7890</b>	<b>6312</b>	<b>3352</b>	<b>17554</b>	<b>2754</b>

### Consumer Impact Minimal in Kansas

Gary Haden, energy writer for the *Wichita Eagle Beacon*, the dominant newspaper in Kansas' largest city, describes the politics of natural gas in his state as "a circle of misery." Kansas consumers are angry because their gas costs have gone up almost as much as they have in other parts of the country. Distribution companies are not happy because the lower volume accompanying higher prices makes it necessary to fight for further increases from reluctant state regulators. The royalty owners and producers in the Hugoton field of southwest Kansas are unhappy because the price of their resource continues to be controlled at one-fifth the national average price. To add insult to injury, volumes in the Hugoton field have dropped by two-thirds. Completing the circle, Kansas politicians are frustrated by their powerlessness over their own energy economy.

Pushed to do something, Kansas politicians are taking the worst possible action by adding price controls to intrastate production wherever possible and by pushing for the continuation of wellhead price controls in Washington. Ultimately state price controls at lower-than-the-federal level will drive even more gas out of the state. Ninety percent of Hugoton gas already moves to interstate pipelines. As a result, federal price controls continue to penalize Kansas' revenues and have almost no benefits for Kansas consumers.



By three purchasers of Hugoton gas deliver any meaningful amounts to Kansas consumers. Northwest Central, formerly Cities Service Gas and now owned by Northwest Energy, accounting for 40% of Hugoton field capacity took only 14% of the field volume in 1982. During the same period, Hugoton gas accounted for only 15% of total purchases by Northwest Central. Deliveries to Kansas consumers, in turn, accounted for less than a third of Northwest Central's total deliveries. This suggests that indirectly less than 5% of Hugoton gas moves through Northwest Central's pipeline to Kansas consumers. Meanwhile, Northwest Central pays about \$0.50 an mcf for Hugoton gas, while Kansas consumers pay more than \$5. Pipeline and distribution charges are about \$1.50 leaving the remaining \$3 to be paid to out-of-state producers. In other words, Kansas consumers through Northwest Central Pipeline pay a subsidy of \$3 an mcf amounting to some \$300 million a year, or 30% of the state budget, to non-Kansas producers. Some of this subsidy even finds its way to Mexico through another pipeline! KP&L must match the terms of any other potential purchaser including rate of take if it is to retain its Hugoton supply.

Most of the out-of-state payments went to Standard of Indiana for gas produced in Wyoming and shipped by Northwest Central to Kansas. Standard of Indiana hardly wins on this basis because it is also the second largest operator in the Hugoton field where it receives low prices that more than offset the high prices it gets in Wyoming. Meanwhile, Northwest Central has now reneged on some high-priced contracts with Standard of Indiana, while lobbying to keep the Hugoton price low. Abrogating its contract for Wyoming gas, Northwest Central will be able to reduce its purchased gas costs to bring them in line with the industry average.

At the same time, the head of Northwest Energy is doing his best to convince the Washington representatives from Kansas that they should continue to support price controls to keep the price of gas down to Kansas consumers. Our view is that decontrol would not change the industry average price and, therefore, the price to Kansas consumers would not change. Instead, by retaining more of the same amount spent, the state would be much better off.

There is only one major purchaser, Kansas Power & Light, that delivers Hugoton gas directly to Kansas consumers. Through KP&L, Kansas consumers used 11% of Hugoton volume last year even though KP&L has only 6% of the daily capacity of the field. Despite the low price of this supply, KP&L still charges residential customers two-thirds as much as does Gas Service Company, which gets its supply from Northwest Central. State legislation upheld by the Supreme Court until the end of next year keeps the price of 22% of KP&L's Hugoton supply at about \$2 an mcf instead of \$2.80 currently. The other 78% is restricted by contract to about \$0.28 an mcf giving KP&L an average price of about \$0.67 for Hugoton gas. KP&L buys all of its Hugoton gas from Mesa Petroleum, the operator for Mesa Royalty Trust. The president of KP&L also supports a continuation of federal price controls. Even under existing legislation, 22% of the Mesa KP&L volume will become unregulated in price after 1984. The contract for the remaining 78% expires at the end of 1989. At that time, Mesa has the option to sell the gas to any other purchaser, most likely an interstate pipeline. KP&L must match the terms of any other potential purchaser including rate of take if it is to retain its Hugoton supply. Since federal decontrol as now contemplated would not be fully effective until 1988 anyway, KP&L would save only two years of full benefit from the low contract price. Meanwhile, the state of Kansas loses the revenue it could be gaining from the great bulk of Hugoton production that moves out of state.

The only remaining meaningful amount of natural gas produced in Hugoton and sold in Kansas moves through the KN Energy system. KN also has about 6% of Hugoton capacity, but delivers less than one-sixth of its gas to Kansas. Thus, about 1% of Hugoton gas finds its way to Kansas consumers through the KN system. Other offtakers, including Panhandle and InterNorth deliver even smaller amounts to Kansas consumers.

The severance tax shifts the balance from costs to benefits of a wellhead price increase in the Hugoton field (see Table 4). Without the severance tax, the incremental benefits are 5% for the corporate income tax and 10% for the indigenous ownership. Costs of 11% for the KP&L volume, 5% for the Northwest volume, and 1% for the KN Energy volume offset the non-severance tax benefits. Adding 8% for the severance tax to the benefit side clearly tips the scale. The severance tax, corporate income tax, and indigenous ownership benefits continue indefinitely. The cost of 22% of the KP&L volume will be deregulated anyway on January 1, 1985, and the contracts for the remaining 78% of KP&L volume expires at the end of 1989. The Northwest Central numbers are soft also as the pipeline's charges to Kansas consumers have shown no relationship to the price of gas in the Hugoton field. Under decontrol, Northwest would be able to reduce the price that it pays for gas elsewhere to make up for the increased price that it would pay for Hugoton gas. Thus, on a long-term basis a wellhead price increase seems to be almost all benefit for Kansas and almost no cost.

Table 4  
 Kansas Hugoton Gas Field  
 Wellhead Price Change  
 Benefits and Costs to Kansas

			Incremental Revenue (%)
<b>Benefits:</b>			
Severance tax			8
Corporate income tax			5
Royalty and production income to Kansas citizens			10
		Total	23
	Share of Hugoton (%)	Delivered to Kansas (%)	
<b>Costs:</b>			
Kansas Power & Light	11	100	11
Northwest Central	15	30	5
KN Energy	13	10	1
Other			1
		Total	18

There is also the capital outlay for 4,000 wells. Expenditures of a half to a billion dollars in southwest Kansas would do a lot for the local economy as far away as Wichita, an oil-service center. While parts of Wichita show signs of growth, the recession in the oil-service business as well as in aircraft manufacture seems to have taken its toll in abandoned store fronts.

The irony of exporting all that Hugoton gas at one-fifth its value while paying full value for all the gas consumed in Kansas has not been lost on Kansas politicians. Frustrated, they are trying anything they can think of to regain control over their own resources. The Kansas legislature gave serious consideration to a bill that would establish a Kansas Natural Gas Authority empowering it with eminent domain to condemn the Hugoton field and buy the properties for the state. The bill was co-sponsored by 21 Republicans! Of course it did not get anywhere because the federal courts have made it abundantly clear that regulation of interstate natural gas is a federal affair. Efforts to continue federal regulation and to oppose infill drilling stem from the same frustration, but if successful would merely reinforce the control that outsiders have over Kansas resources. In the end, we think that it will be clear that if Kansas consumers are unable to get their hands on lower-priced Hugoton gas, the state may as well do all it can to get the price as high as possible. That means supporting the movement for federal decontrol, at least behind the scenes if not openly. Then if it becomes clear that decontrol will not be enacted this time, the state should authorize early infill drilling.

A Kansas Natural Gas Authority might still be a good idea. Instead of buying the whole Hugoton field it might just buy Mesa Royalty Trust, which has a 90% profits interest in the gas delivered to Kansas Power & Light. The state could issue tax-exempt bonds to finance the purchase and perhaps KP&L could become an equity participant. There is no lack of conviction at Kansas Power & Light about the value of its contract with Mesa. Because of the structure of Mesa Royalty Trust, there is no need to get a controlling interest. Each share represents ownership of properties. While the trust holders are not operators, it does not matter because the major operating decisions are made by the Kansas Corporation Commission when it establishes field rules. Just as we estimate that the present value of future cash flow to a taxable investor in Mesa Royalty Trust is \$40 a share, the present value to a tax-exempt investor, such as the state of Kansas, would be much higher.

After visiting with business and government leaders in Kansas, we sense that while the current problem is obvious, there has been little formal analysis of the long-term costs and benefits. Infill drilling has not yet been proposed to the Kansas Corporation Commission, which must make the final decision. The best timing for such a proposal may be when it is clear that Congress will not decontrol wellhead prices if such is the case. At the same time, it would be helpful if the volume decline in Hugoton reversed itself. As long as production remains at current levels there is no need for infill drilling to expand capacity. Once production turns, then the Kansas Corporation Commission can reckon that additional capacity will eventually be needed and that the drilling could start in anticipation of that day. While the driving force for infill drilling is undoubtedly economic, the ultimate rationale in the legal sense must be consistent with the encouragement of conservation of natural gas resources, which is the basis for state regulation of field rules. In support of this, infill wells would add 5 to 20% to total reserves.

### **Long-Life Reserves May Be Understated**

Annually half of the wells in the Kansas Hugoton are shut in temporarily to measure wellhead pressure. The results are used to determine the deliverability of each well, which in turn is the most important factor in determining its basic allowable rate of production. During 1982 the measure of pressure in the Hugoton field actually increased even though gas production continued. Acknowledging that one year's measurement may be an anomaly, let's look at the results over the six years from 1977 through 1982. Shut-in pressure declined from 193 pounds per square inch gauge (PSIG) to 166 PSIG as 2.6 trillion cubic feet of gas were produced. The average amount produced per 1 PSIG change in pressure was 95 bcf. At that rate, the field would theoretically produce almost 16 trillion cubic feet before the pressure reached zero. Of course, the last few trillion cubic feet might take forever to extract. Eventually, vacuum equipment could be installed to speed this process along.

Six pipelines control 98% of the capacity in the Hugoton field (see Table 5). Thirteen producers operate more than 90% of the capacity. Over 100 operators are active in the field. While the State Corporation Commission of Kansas publishes data monthly on each of 4,163 wells, only the operator of each well is listed. The operator usually accounts for the dominant working interest, but not always. Normally the working interest is also subject to a one-eighth landowner royalty. Mesa Royalty Trust has a 90% net profits interest in half of the volume operated by Mesa. The other half of volume operated by Mesa is shared equally in ownership with Tenneco.

Table 5  
 Kansas Hugoton Gas Field  
 Deliverability by Purchaser and Operator  
 (percent)

	NW Central	Inter- north	Coastal	Pan- handle	KN	Kansas P&L	Other	Total
Mobil	7.8	15.6	0.0	0.1	0.0	0.0	0.0	23.6
Std of Indiana	19.9	0.1	0.2	0.0	0.1	0.0	0.0	20.3
Occidental	3.6	3.4	2.8	2.4	1.6	0.0	0.0	13.9
Mesa	5.3	0.0	0.9	0.3	0.0	5.7	0.0	12.2
Panhandle	0.0	0.2	0.0	4.0	0.0	0.0	0.0	4.2
Helmerich & Payne	0.4	0.6	2.4	0.2	0.0	0.0	0.0	3.6
KN Energy	0.0	0.1	0.0	0.0	2.8	0.0	0.0	3.0
Atlantic Richfield	0.0	0.0	1.0	0.0	0.0	0.0	1.7	2.7
Union Pacific	0.1	0.4	0.9	0.0	0.6	0.0	0.0	2.1
Osborn	0.0	0.5	1.1	0.5	0.0	0.0	0.0	2.1
Northern Pump	1.2	0.2	0.0	0.0	0.0	0.0	0.0	1.4
Texaco	0.5	0.6	0.0	0.0	0.0	0.0	0.0	1.1
Walter Kuhn	0.0	0.5	0.1	0.5	0.0	0.0	0.0	1.1
Other	1.1	3.0	1.3	2.5	0.8	0.0	0.1	8.8
Total	39.9	25.2	10.8	10.6	6.0	5.7	1.8	100.0
Production, 1982	14.1	33.2	7.8	15.1	12.3	10.6	7.0	100.0
Reserves	29.0	26.3	6.7	15.7	7.6	7.7	7.0	100.0
Reserves/production	84	32	36	43	25	30	41	41
Pressure (psig)	173	167	183	144	174	129		166
Production (bcf)	30.2	71.0	16.6	32.3	26.4	22.6	14.9	214.0
Reserves (bcf)	2540	2310	590	1380	670	680	610	8770

### Volume Rebounding

From an interim peak of 557 bcf in 1978, annual volume declined to 214 bcf last year, well below the allowable rate of production of 379 (see Table 6). Volume declines were particularly steep during the first three months of 1983. A turn may have occurred in May when volume exceeded that for the previous year on a monthly basis for the first time since at least 1980.

Already pipelines are finding ways to cut back on high-priced supplies and take more low-priced Hugoton gas, which has the automatic effect of slowing down and even reversing temporarily the increase in average cost of gas to pipelines. One of the major thrusts for new legislation in Washington is to break contracts that require pipelines to take high-priced gas. That alone would pave the way for increased Hugoton volumes, but we do not expect such legislation to be enacted except as part of a broader package. Contract abrogation is too serious a matter to pass lightly. If contracts are to be abrogated on high-priced gas, the cost of doing so will be abrogation of contracts on low-priced gas. In either case, Hugoton volume will be up and in the latter case Hugoton price will be up as well.

Investors seem to be unduly influenced by the negative trends of the past few years and by the political rhetoric accompanying last winter's price increases. These adverse influences contribute to making Hugoton gas one of the most attractive natural resource investments now available. That attraction applies to investors who can buy stocks such as Dorchester Hugoton, KN Energy, Mesa Royalty Trust, and Panhandle, which own Hugoton production; to exploration companies that can divert part of their exploration budget to buying properties that have little downside risk and as much upside potential as most exploration projects; to opportunistic financial entrepreneurs who could buy producing properties and royalty interests using pooled funds from institutional or individual investors; and to the state of Kansas, which can buy properties, particularly Mesa Royalty Trust, to lock in long-term economic benefits that will be difficult to preserve by artificial regulatory measures.

Table 6  
 Kansas Hugoton Gas Field  
 Allowable Production and Actual Production  
 (billion cubic feet)

Year	Allowable Production	Actual Production		
1983E		170		
1982	379	214		
1981	393	373		
1980	411	418		
1979	544	497		
1978	599	557		
Actual Production	1983	1982	1981	
January	16.7	38.7	48.6	
February	11.9	30.7	38.8	
March	12.8	20.0	35.6	
April	14.7	19.3	28.5	
May	17.8	13.9	30.2	
June	13.0	12.4	30.1	
July	14.0	13.2	33.6	
August	14.0	14.9	28.2	
September	11.0	9.2	22.1	
October	12.0	10.0	25.1	
November	14.0	15.0	21.5	
December	18.0	16.7	30.6	

Note: 1983 actual through May.

Kurt H. Wulff

KURT WULFF  
Donaldson, Lufkin & Jenrette

February 14, 1984

The analysis that you referred to that I did last August was done primarily for our investor clients, and I recast that same analysis in a different form, feeling that the same information that was useful for investors might have some use for Kansas citizens, and I called it "Rediscovering Hugoton: Recommendation for Kansas". The first line of the repackaged analysis summarizes what I would like to cover this morning. The first sentence reads: "That we recommend that the citizens of Kansas urge their State Corporation Commission to permit infill drilling in the Hugoton Gas Field to create 2 billion dollars of new wealth today for the state and its citizens without increasing the cost of gas to consumers in Kansas by any meaningful amount." That sentence captures the essence of what I would like to talk about. I suppose we all ought to be sure we understand what we mean by infill drilling, and the reason that we emphasize it. During the normal course of development of oil and gas fields, further drilling is undertaken to maintain the capacity of the field; more drilling of wells in the same field, also known as infill drilling. This would normally take place in any event, but the important distinction in the Hugoton Field is that the new wells would qualify for a much higher price, roughly \$2.80 to \$3.00 wellhead price for new wells compared to an average wellhead price today of about

50¢, maybe 60¢. After infill drilling, somewhat more than half the production would be priced at this \$2.80 to \$3.00 level and the other half would still be 50¢, but the average wellhead price would increase to something around \$2.00. The main economic significance in infill drilling is that it is a way in which the wellhead price can be increased under existing federal regulations. The purpose of this, in an economic sense, is to create 2 billion dollars of new wealth today for the state and its citizens. I've approached the benefit side of this issue in a comprehensive way of trying to project volumes and prices out of the future and discounting them back to the present. Before I describe that calculation, which is a little bit complicated, but it has a powerful implication, let me just review in simple terms what the economic benefits are from a higher wellhead price. Let's assume that the volume at a given year in the field is about 400 billion cubic feet. Several years ago, the volume was 550, last year it was around 200. The volume is recovering very sharply now, so for the purposes of our discussion, let's think of 400 billion cubic feet of annual volume. At \$2.00 an mcf, that's 800 million dollars in revenue, of which about 3/4 of that, or 600 million, would be incremental. So we're talking about one, or two, or three years out, the incremental revenue at today's \$2.00 price is about 600 million dollars. Now, how much of that stays in Kansas, that's the essence of the benefits of a higher wellhead price. Well, you legislators passed a severance tax last year, which would keep 8% of the incremental revenue for the state of Kansas, the severance tax at 8%. And there's a corporate income tax in Kansas which would be 4 or 5% of incremental revenue. And the



next most important element, or even a little larger than income tax, is the, I think it's called the ad valorem tax or the property tax that accrues to the southwestern counties. In my analysis of last August, I ignored that factor, I have since learned a little more about that. That would add another 6% of incremental revenue to at least the western counties of Kansas. And finally, a significant amount of gas production is owned by Kansas residents. Most of the royalties held on the field are held by landowners in southwestern Kansas, as I understand it. And some of the working interests in the field are held by Kansas citizens. I've estimated that about 10% of the incremental revenue would accrue to Kansas citizens directly, so we'd have 8% for the severance tax (I recognize that 1% is credited against the ad valorem tax, but let's ignore that). Eight percent for the severance tax, plus let's say 4% incrementally on the income tax, that's 12, plus another 5% for the ad valorem tax, 17%, plus another 10% for the ownership of gas reserves by Kansas citizens, so 27% of this incremental revenue, 600 million dollars, or about 160-170 million dollars a year would benefit the citizens of Kansas. In my analysis of last August, I approached it in a more comprehensive way. I've just given you what a one year impact would be, but it's more important, of course, to look over the life of the field. I used what we call a discounted cash flow technique. That technique has come in for its share of criticism, so let's use it for what it tells us and not necessarily rely on the very specific numbers. But in our calculation, we project the volume of the field out to the year 2020, assuming that about 8 trillion cubic feet of gas would be produced.

Eight trillion cubic feet is about the amount of reserves estimated by pipeline companies according to information furnished to the Kansas Corporation Commission. The company that I cover, and my main business is analyzing the investment characteristics of operating companies, the companies that I cover, using the engineering firm of Degarder and Mcnodden, estimate lower reserves than that. They're more conservative, and their level might be more like 4 trillion cubic feet. On the other hand, the operating characteristics of the field have been favorable. Last year the pressure actually went up which is almost unheard of, and we could, on that basis, be more optimistic about the ultimate reserves and they could be 12 or 16 trillion cubic feet. What I'm trying to say is that estimating reserves is clearly not a precise science, but 8 trillion cubic feet that I'm using here is a reasonable number. I think it ought to be higher than that eventually, although I am not a reservoir engineer. The profile which we would expect that 8 trillion cubic feet would involve some fairly sharply increasing production in the next few years. To stay at the 400 billion cubic feet level and remain flat for five, or six, or seven years after that and then decline. Well, that's the volume projection under which we based our discounted cash flow calculation.

Senator Angell you could be looking at Table 1 or Table 3. Ultimately, I'm going to be explaining Table 3. The volume and price assumptions and revenue assumptions are the same in each case. I have just explained then the first column, production, of Table 3. Now to make assumptions on price, we have to also guess what might happen in the future. What I have done is to relate the gas price to the oil price ultimately. We've assumed that oil prices after a lag

would increase with inflation, and I assumed a 7% inflation rate. That could be the subject of a whole debate in itself, so I hope I'm wrong, too. If oil prices then increased at 7% a year, we then assume that by the year 2000, that gas prices will be the heating equivalent of 80% of the oil prices. Gas prices now, at a competitive level, they are about 60% of the oil price. In other words, gas prices are competing with the lower quality form of oil, residual fuel oil. As time goes on, gas will be used more as a premium fuel, and it should have a competitive price with oil that's higher than it is today. That's how I assume that by the year 2000, the competitive price level for gas might be 80% of oil. We start with today's gas price, it increases fairly rapidly over the next few years with infill drilling, and then after that it increases towards the 80% of oil equivalent. Now, I'll be the first to admit that \$47.00 per mcf gas price in the year 2020 sounds ridiculous, but we counter that with a discount factor that's even greater than the escalation factor. I'll explain that a little bit later on. Production times price gives us the projected future revenues, and these, of course, are mind-boggling numbers, that the Hugoton field would generate future revenues of 80 billion dollars over this time period. The royalty owners would take 10% of that off the top. The beauty of being a royalty owner like being a tax collector, you don't have to worry about the cost. The royalties, and the severance tax and the ad valorem tax are taken off the top before any calculation is made for operating costs. The royalty column is simply 10% of the, well, it's really royalty plus a little working interest, 10% of the revenues. I have a column for projected severance tax which we calculate here at 8%. That adds up to 6 billion dollars of severance tax over

the life of the field. Then, there's the corporate income tax, which is actually low during the time that infill drilling is under way, because the infill drilling can be deducted from the income to be used for calculating corporate income tax. I left out in this case the ad valorem tax, making the calculation more conservative. My cash flow, then, to the state of Kansas is a combination of royalty plus severance tax plus income tax, which adds up to some 18 billion dollars. The next step is to discount that to the present. I use a 12% discount rate. What we're saying here is how much money could be invested today to accumulate to 18 billion dollars over the next 35 years at a 12% interest rate. And that number works out to be \$2,754,000,000, much too precise, but almost 3 billion dollars. So, what I've been saying the last five minutes or so is to justify an estimate that the value today of the future revenue to be generated by the Hugoton field for the state of Kansas is some 3 billion dollars. That happens to be total revenue, including the revenue that would have been generated anyway at today's low prices, but more than 2 billion dollars of that would be incremental, and that's where I come to the conclusion that infill drilling for the state of Kansas is worth 2 billion dollars in wealth today. I think that Senator Angell might think that my escalation rate or inflation rate might be higher than he would like to see, on the other hand, my discount rate is also fairly high, and those two tend to offset each other. A governmental body really ought to use a lower discount rate because you can borrow money on a tax exempt basis for considerably less than 12%. The numbers are pretty big no matter how you calculate them. The benefits of infill drilling, in my opinion, are very clear. At the same time,

we said that there would not be any meaningful amount of increase in cost to the citizens of Kansas. This side of the analysis is a little softer. That is, we can show that a fair amount of Hugoton gas is actually delivered to Kansas consumers. Most of it, of course, goes out of state. And the number, the percentages, you use depend on what year you're using as the base. For the sake of discussion this morning, let's say that 10% of the Hugoton gas goes directly to Kansas consumers through the Kansas Power & Light system. Kansas Power & Light's capacity of the field is only 7%, so that's an overstated number to some extent. So, 10% of the gas in the Hugoton field is used directly by Kansans and then another 10% of the gas indirectly comes back to Kansas through the interstate pipelines. Another 10% for the purpose of our discussion this morning -- the actual number is a little higher than that, and it depends on the year. So if you looked at it in simple terms, we'd have 20% of the higher wellhead costs borne by Kansas purchasers. That's still less than the 27% that accrues to Kansas on the benefit side. But to say that 20% is borne by Kansas purchasers is, in my opinion, a gross overstatement, particularly over a long period of time. The portion that comes back to Kansas through interstate pipeline companies doesn't bear any resemblance in price to the wellhead price of the Hugoton field and you all know this painfully well; that the cost to Kansas from Northwest Central Pipeline has zoomed in the past few years while the price of gas in the Hugoton field hasn't changed. So there's been no relationship in the past between the price of Hugoton gas and the cost to Kansas consumers. If the Hugoton price went up, we don't think that the price to Kansas consumers would necessarily go up.

The Northwest Central prices ought to be coming down now anyway because Northwest Central has made purchases of high-priced gas from out of state and in many cases Northwest Central's price, certainly to industrial users, is at the economic limit. They can't sell more gas to industrial users at these prices. To the extent that Northwest Central's costs of gas in Hugoton go up, that would bring about further reduction in purchases of high priced gas from other sources or the gas simply wouldn't move. Well, that's a complicated area, and the point that I just want to make, though, is that there isn't a very clear relationship between the low price of gas in the Hugoton field and the price that Kansas consumers pay to interstate pipelines. So the 10% of volume that goes to Kansas in that form is really not a big cost to Kansas consumers in the end. Now in the case of the Kansas Power & Light volumes, another 10% we're saying here, the connection is more direct. But even Kansas Power & Light has acquired high priced gas from other sources. And in the case of Kansas Power & Light, the amount actually delivered to residential consumers is fairly small. In 1982, Kansas consumed about 83 billion cubic feet of natural gas for residential uses. If I remember right, about 13 billion of that came from Kansas Power & Light and about 30% of Kansas Power & Light's gas came from the Hugoton field. So only 30% of 13 billion, about 4 or 5 billion cubic feet of gas from the Hugoton field flowed through the Kansas Power & Light system to residential users. That 4 billion is only 5% of all the gas used in the state. Well, there will be some impact on the Kansas Power & Light consumers in the early years, that's unavoidable, and I think that's a reasonable tradeoff though, because it's a small amount compared to

the benefits to the Hugoton field. But then if you look out a couple of years, of course, it's going to take a few years for infill drilling to become effective anyway, and if you look to 1989, then Kansas Power & Light's contract for this low price gas expires, so any impact from higher prices from infill drilling will be fairly short-lived on Kansas Power & Light's contract. When you look over the period after the year 2020, the cost of higher wellhead prices to Kansas Power & Light consumers is much smaller yet so there isn't much cost beyond the 1989 period. So I feel that the benefit numbers that I've been citing, the severance tax, the royalties, the income tax and the property tax, those are all hard numbers. Typically, they're all off the top except for the income tax. The cost numbers where the prices might go up on gas to Kansas consumers are all soft numbers. Half of that volume comes through interstate pipelines which are charging a price unrelated to the Hugoton gas and the other half of the volumes go through the Kansas Power & Light system, where the contract expires in a few years anyway. So, I've gone through a longwinded and quantitatively oriented discussion of my point that the citizens of Kansas should urge their State Corporation Commission to permit infill drilling in the Hugoton field to create 2 billion dollars of new wealth today for the state and its citizens without increasing the cost of gas to Kansas consumers by any meaningful amount. Thank you for your attention, and I'd be interested to respond to any questions you might have.

Senator Werts: Mr. Wulff, in your projection of price, I don't believe I caught reference to future prices of crude for the next 35 years and the impact that would have. Did I miss something?



Mr. Wulff: No, that's worth talking about. Your question is...

Senator Werts: The competitive impact on natural gas.

Mr. Wulff: What's the competitive impact of future crude prices on natural gas consumption over the next 35 years. What I've built into my projections is that natural gas is competitive with crude oil today at some 60% of the crude oil price. Crude oil sells for roughly \$30 a barrel, the natural gas equivalent in heating terms is divided six, \$5 an mcf, but the national average wellhead price is more like \$3 and there are numerous instances now where natural gas is competitive with \$3 per mcf, is competitive with oil. And this is worth explaining a little bit because it sounds somewhat complicated. How can you have \$3 gas competitive with the equivalent of \$5 oil. Well, the oil that's used in boiler fuel installations is a lower quality oil, residual fuel oil, while the crude oil price is \$30 a barrel, residual fuel oil in some instances is \$20 a barrel or less. The heating value equivalent of residual fuel oil is about \$3 an mcf. This is fuel oil in just a few limited installations. North Carolina, for example, allows the burning of high sulfur residual fuel oil for the gas suppliers to keep that market that got the price of gas comparable to that low quality fuel. Over time, there will be fewer places where we'll allow the burning of high sulfur residual fuel oil and coal will take some of that market and so on, maybe even nuclear will displace some of that market but that's a big question mark these days. But over time, the premium characteristic of gas will be better appreciated so there won't be much competition with low quality oil, there will be more competition with high quality oil. So I say that arbitrarily by the year 2000, the competitive level with oil will be 80% of the oil

price, or \$4 an mcf in today's terms rather than 60% of the oil price or \$3 an mcf. But to get my projection of gas price in the year 2000, which I agree is hard to believe, \$12 an mcf, we project that an oil price that's flat and then up with inflation at 7% a year to 80% of that oil price is gas equivalent terms and use that as our gas price projection. It may sound somewhat academic, but I think it's a reasonable approach and something you have to do if you're going to weigh the future impact on your decisions.

Senator Hess: Can you tell me presently what the State Corporation Commission permits in the Hugoton field and exactly what you're advocating so I can get a better picture of that.

Mr. Wulff: I appreciate that question. The Hugoton field today is developed on a spacing of one well per square mile. There are 4,100 some wells. That's an unusually light spacing. The next largest gas field in the U.S. is San Juan Basin, it was once drilled on spacing of one well per square mile, but the Mesa Verde formation is now drilled on one well per quarter mile and 12 wells per square mile, and the, I forget the name, but the deeper formation in that field, is now in the process of going to one well for every quarter mile or 4 wells per square mile, so the normal evolution of a large gas field would be towards a denser spacing than one well per square mile. What we're advocating today is the next step. Go from just one well per square mile to two wells per square mile, go from 640 acre spacing down to 320. And that should be good for a number of years, 5-10 years, after which there may be a need to go to a spacing of 160 acres. Now this is a point worth dwelling on for a minute. It costs money to drill these new wells. The 4,000 wells which would cost 100

to 200 thousand dollars apiece, that's 800 million dollars. That money would be spent in Kansas, but not all of it would stay here because it would go for some supplies from out of state. The drilling would take place over several years. The people who spend that money are the working interest owners, and hardly any of the working interest owners live here, except to the extent that you own stock in a Mobil, and you own stock in a Standard of Indiana, you might be a working interest owner. But there's not too much of working interest ownership in Kansas based companies or Kansas residents directly. So the money spent for infill drilling comes from entirely out of state, and that clearly would be a boost to the economy of southwest Kansas. Does that address your question?

Senator Hess: Yes, it does, thank you.

Chairman Angell: In your projections, you didn't say anything about the individual income tax effects.

Mr. Wulff: No, Senator Angell, I tried to keep things simple but clearly this amount of royalty income generated for Kansas citizens would also be subject to individual income tax, and I don't know what your rate is, but if it's 10%, 20%?

Chairman Angell: Not that high, about 9½.

Mr. Wulff: Oh well, that's close, if it's 9%...

Chairman Angell: That's tops. The marginal rate average is somewhere around 5 or 6.

Mr. Wulff: So another 5 to 6%, well, here's what I've done. I've assumed that the royalty payments would all be benefits to the state of Kansas. Now what we're talking about is just who benefits

from that. The individuals would basically keep the 95% of it subject to federal income tax, and the state would get the other 5. But we can't add that on top of what I'm doing. What you could add, I suppose, with the personal income tax on some of the money spent for drilling wells out there in southwestern Kansas.

Chairman Angell: You got tax on the royalty owners. Did you get that? Yeah, you did.

Mr. Wulff: If we were to talk about what the state government actually collects, then a portion of the money that the royalty owners keep would go to the state government.

Chairman Angell: Your table 3, you're assuming infill drilling there?

Mr. Wulff: Yes.

Chairman Angell: Which is reflected by the fact that you have production from 1983 that goes up in about 6 years to 400 billion cubic feet. That's the results of infill drilling.

Mr. Wulff: Well, the production trend over the next few years, the next few years anyway, will be independent of infill drilling to a fair extent. Once you get to the higher levels out in '87 or '88, you probably need the infill drilling to sustain those. Certainly going out into the mid '90s you have to have infill drilling to sustain those levels.

Chairman Angell: But the only way you can go from 160 to 400 million cubic feet is with some infill drilling, isn't it?

Mr. Wulff: Yes.

Chairman Angell: You don't project that we could make it back to there without infill drilling, do you?

Mr. Wulff: I suppose the field could produce 400 million cubic feet for a short period of time without infill drilling, but it couldn't sustain that for very long unless there were more wells.

Chairman Angell: Did you, in your study, make any comparison what would be the effect between no infill drilling and infill drilling, what the effect would be?

Mr. Wulff: Okay, your question is what might this table 3 look like if there weren't any infill drilling, and, well, most of the gas is classified as old gas under the existing, well, the answer's going to depend on volume and price, and maybe I should take the volume side first. The 8 trillion cubic feet of volume I have here might still be produced but it would take many more years to do it, so the volume trend will be somewhat lower, without infill drilling. On the price side, the price would be a lot lower without infill drilling, and assuming that there were never any changes at the federal level. The 50¢ wellhead price we have right now would still be, if 50¢ is one-fifth of the national average, 50-60¢, the Hugoton price and the percentage of national average might even decline over time. So I would say, without doing the calculation very specifically, the non-infill case, making the most observative assumptions, is less than 754 million of this total, less than 20% of the total.

Chairman Angell: Did you studies get into the whole subject of the pressurization of the field? What I want to ask is does anything indicate to you that if we don't have infill drilling fairly quickly we may never be able to do it because of the loss of pressure, therefore the inability to develop a well?

Mr. Wulff: That's a fairly technical question. I have some

understanding of that, but I'm not a reservoir engineer. As I understand it, there are several different formations in the field, that is, the upper formations flow very readily and most of the gas produced to date has come from the upper formations. But the lower formations are fairly tight and need to be fractured to produce better, and there is one line of reasoning that says if that fracturing isn't done now, it can't be done at lower pressures later. So I am aware of that line of reasoning. I'm not competent to say whether that's really necessary. I think it is clear that for tight formations you do have to have more wells to produce the reserves in those formations eventually.

Chairman Angell: So your analysis then is an economic analysis and not one of the pressures of the reservoir at all.

Mr. Wulff: My analysis is an investment analysis which deals with the major technological factors and their economic impact. I think I've hit the highlights. You could be more sophisticated on any one of my points if you wanted to be.

Senator Kerr: The scenario sounds great, obviously, what's the catch? You mention the effect on KPL would be fairly negligible...

Mr. Wulff: I think the, well, I ought to give you another point. The chairman of Mobil was asked before the New York Society of Security Analysts recently whether there would be infill drilling in the Hugoton field, and he said, there's plenty of capacity, there's no need for infill drilling, so part of the catch might be that there's a mentality that you didn't really need infill drilling in the Hugoton field until the production was actually bumping up against the capacity. Today the production rate is, well, we thought it was

going to be as low as one-third of capacity, but it's been coming back very rapidly in recent months. But what I would say is, you have to look a couple of years ahead. It won't be too long before the Hugoton field will be producing up near capacity again. You want infill drilling, particularly in the winter months if you need to get more gas on a short term basis, but you won't have it, it will take a couple of years to actually develop it, and then, of course, Senator Angell's point about if for technical reasons, maybe you should be drilling those wells now rather than later as well. I think part of the catch is the Chairman of Mobil is a very bright fellow but he's not keeping up to date on the Hugoton field, Mobil's got a lot of other things going on, and his mindset is that if the production rate is low relative to capacity we don't need infill drilling. And I guess KPL might give you a little different slant on my numbers, they might not minimize the impact as readily as I do, but I think there's room for disagreement there, and you still come out on the side that the economics for the state of Kansas clearly favor infill drilling. You could say there's a fourth, I asked this question of a Representative Slattery at a meeting that he addressed in Florida earlier, how in the world can you be for lower wellhead prices when Kansas has already got the lowest wellhead prices in the country and your state would be much better off with higher wellhead prices, and Jim Slattery said, well, something to the effect that the voters have spoken, the voters object to higher wellhead prices somehow. So I think the point is that he, if he has looked at the economics, and I'm sure he has, they don't seem to be important to him because he thought he was getting a different message from the voters. A



significant implication here is that the implementation of infill drilling has to be presented in a way that emphasizes its long-term advantages and minimizes any short-term disadvantages.

Chairman Angell: Senator Kassebaum says the same thing Representative Slattery says.

Senator Feleciano: I think your report is excellent and obviously, representing, you work with Donaldson, Lufkin & Jenrette...

Mr. Wulff: He's a Democrat. This the Democratic side over here?

Senator Feleciano: My contention is that the motivation in your report, do you sell securities...

Mr. Wulff: There should be no secret about how I get paid. And in the report we footnote that. The people that pay me, at least indirectly, are institutional investors, insurance companies, banks, mutual funds. My job is to tell them, recommend to them, what oil and gas stocks to buy and sell, and I try to come up with unusual angles, things that other analysts aren't already working on. I guess I could go at long length to tell you about my pitch to institutional investors. But in this case we are recommending that investors should buy the companies that own low-priced gas. The original analysis was aimed at showing how attractive it was to buy gas in the Hugoton field relative to exploring for new oil and gas in Alaska or anywhere else. It turns out that it's not really a big investment issue because you're not going to buy Mobil or Standard of Indiana for their Hugoton representation. It's not big enough in the total company. There are a couple of smaller plays. Well, we're recommending Panhandle Eastern but even in Panhandle's case, infill drilling would add only 10% to the value of the company. There are

some smaller plays, we're recommending Mesa Royalty Trust, as well as K-N Energy and a little company called Dorchester Hugoton. The Mesa Royalty Trust recommendation is, if we believe that it makes sense for investors, it might also make sense for the state of Kansas. To go back to my recommendations to investors, if they don't hold up, over the 13 years that I've been working with them, I won't have much creditability...(end of side)

Now when infill drilling's implemented, the people who own low-priced gas reserves will gain some of the economic benefits that they haven't gotten over the last 10 years when the value of gas production goes up.

Senator Feleciano: You're absolutely right, and I appreciate what you're saying, in fact, before the session is over I might be contacting you...

Mr. Wulff: I'd like to have your account.

Senator Feleciano: But all kidding aside, would you not say then, in that regard, because of who you're dealing with and the magnitude of the issue, that obviously your report is going to slanted in such a way that it's in the best possible vein, especially when you start looking at the scenario that you have laid out before us from '83 to the year 2020, hypothesizing that certain things are going to happen and based on that criteria then you come up with the best possible scenario that the state of Kansas stands to gain...

Mr. Wulff: Well,

Senator Feleciano: My concern, though, is you touch lightly over the issue of KP&L who is now a servicing utility in my senatorial district, visavis the fact they bought Gas Service Company, you've

gone over lightly as the impact to KP&L, and what the numbers are going to be. I tend to differ with your analysis that the impact to KP&L customers are going to be so light...

Mr. Wulff: Okay, I don't mean to go over that lightly. I try to represent my work as being a balance, it can't be extreme. If it's extreme, my clients won't have any confidence in my further analyses. Ideally, the outcome could be higher as well as lower. In the case of KP&L, and that's where if there's a flaw in the case or an objection to the case, it ought to come from that point, their percentage of the capacity of the field is 7%. They got more last year because they produced their full allowable while other companies produced under their allowable, but on a long term basis, all KP&L can look for is 7% of the field. Their contract has two parts to it, 22% of their gas is already priced at \$2, 78% at a low 28¢ price. So really you have to take that 7%, multiply it by 78%, down we're down to 6% of the field is low priced gas that is delivered to Kansas consumers for now. But that low price expires in 1989. So it's not 6% for the life of the field, it's only 6% for 5 years, out of the remaining 35 years. So somewhere between 0 and 6 is the benefit for KP&L, and that doesn't make any difference. If the benefit for the state is up here in the 27% of incremental revenue category, and the benefits resolve the cost, the cost to KP&L customers is somewhere between 0 and 6, you can be pessimistic or optimistic on the KP&L issue and still be very confident that the higher wellhead prices are in the best interests of the state.

Senator Feleciano: You say that the net gains to the state of Kansas outstrip any increase to Kansas consumers. I would agree

with you 100% in that analogy if my constituency in Wichita would benefit. I don't see how they are going to benefit. I really don't.

Mr. Wulff: Your constituents are Wichita? Wichita is under the Kansas Power & Light gas system? It isn't.

Senator Feleciano: It sure is.

Mr. Wulff: Your constituents will probably see lower, I won't be sure of this, may see lower gas prices even though the Hugoton gas prices are going up.

Senator Feleciano: You mean by allowing infill drilling, you're saying...

Mr. Wulff: The connection isn't that direct. But your constituents are paying several times as much for gas today as they were a few years ago and the Hugoton compliments of that haven't changed. Now the high priced gas from other sources is being cut back. The supplier to Gas Service Company is reneging on some high priced contracts and renegotiating where they can. They're trying to bring that number down, I hope they're successful, the trend may be down, or shouldn't be up more this year than last year. The heat should be off in terms of the rising prices, the news may even be getting better. Infill drilling will take several years to achieve anyway and as it comes in there could just as well be more high priced contracts cut back. Certainly to the extent that you use industrial gas in Wichita there are competitive pressures to keep the price from going up any higher. Those competitive pressures make it more important for Gas Service Company or their supplier to reduce uneconomic purchases to deliver a final product that's no higher in price. In Wichita, you would have to say why should those constituents on the KP&L system

get the benefit of low prices when you're already paying higher prices. Not that I'm trying to stir up any dispute here.

Chairman Angell: The question is in fact an infill drilling question. What you're presenting is not a decontrol question.

Mr. Wulff: Okay, yeah...

Chairman Angell: The effect of decontrol and the effect of infill drilling on the KPL system is two different things.

Mr. Wulff: On the KP&L system, or any system, or for the state as a whole, decontrol is even more advantageous than infill drilling. Decontrol for the country would bring down all those uneconomical contracts, so the high priced sources that Gas Service is paying for through Northwest Central would be gone. Decontrol would equalize gas prices throughout the country and the suppliers to Gas Service Company would have a lower average cost, if I remember right, than a higher average cost, because they are quite dependent on some of these high priced supplies, and decontrol would clearly be a more efficient economic solution. We would love to see natural gas decontrol, but the practicality is that we're not going to get natural gas decontrol, it doesn't look like it, out of the federal government this year. Maybe there is some opportunity in the future. In this analysis last August, I took the position that while it's clear decontrol was most attractive, once it became evident that decontrol wasn't going to occur soon, then Kansas should move towards implementing infill drilling as soon as possible. We're at that stage today.

Chairman Angell: Let me ask you a question. We have, I think I've read, that we have 15% more production than we've had demand. What good does it do to get more reserves in the Hugoton field if

you can't sell them?

Mr. Wulff: Well, there is a surplus of deliverability over current demand, and your numbers might be right in the wintertime of, I think you said, 15% surplus, but over the year the percentage is even greater than that, it might be 30%. Nobody knows what's going to happen in the future, but the substantial gas volumes have come down, but the capacity hasn't changed much, the volumes have come down, therefore the gap has opened up. The gap is starting to close already. We think it bottomed out in the third quarter of last year. The economy is picking up. The most optimistic projections actually call for a shortage in about a year and a half.

Chairman Angell: A year and a half?

Mr. Wulff: That's too optimistic in my point of view. Our position is that natural gas supply and demand will be in balance in about two years; and if infill drilling takes time, you would then have it in place three or four years out when the cushion between demand and deliverability is quite a bit smaller. You'll want that extra capacity when it's available.

Senator Feleciano: Your accompanying oil and gas report of August 1, 1983, you state that if gas is decontrolled you expect the state of Kansas to allow infill drilling within two years, which in turn, can provide two-thirds of the benefit of decontrol. Can you explain that statement?

Mr. Wulff: The first part of that statement is clearly presumptuous, but we have to anticipate what would happen, and there are other investors who feel that infill drilling is many years away, so that the stock prices for securities or companies that have a position in

infill drilling, we think are depressed. So by taking the view that it will occur sooner rather than later, we build our case and the reason for buying those stocks. The other half of that, I don't know how to explain how we are being presumptuous, I hope that you understand that I'm trying to do the analytical job, and if I could influence you, I would love to do so, but I know that you're going to draw your own conclusions. The other half of that statement that infill drilling will provide two-thirds of the benefit of decontrol is just a simple representation of the fact that the wellhead price in Hugoton would go to, say about, \$2 on average with infill drilling instead of \$3 with decontrol. Two dollars is two-thirds of \$3. It's not intended to be a very precise statement.

Chairman Angell: Further questions? The last page of your report says:

"Annually half of the wells in the Kansas Hugoton are shut in temporarily to measure wellhead pressure. The results are used to determine the deliverability of each well, which in turn is the most important factor in determining its basic allowable rate..."

What's the importance of that statement? Is it important because that would affect the amount of production?

Mr. Wulff: Okay, uh, as I look back upon it, the fact that really sticks out in my mind when you talk about pressure, the facts are two. One is that, and at the end of the report I was talking about how much the pressure declined in recent years and compared that to the volume of gas produced and assumed that if the pressure continued to decline down to 0 and you produce the same amount of gas per given amount of pressure declined, the remaining production might



be as much as 16 trillion cubic feet. It's going to take a long time to get that out. So while the pressure is significant in suggesting what the future production might be, the other element of pressure in the Hugoton field which is really unusual is that the pressure actually went up last year. That means that in the classic engineering sense that every year you produce gas and the pressure goes up, you got infinite reserves.

Senator Chaney: You mention decontrol, and we've had other people come in and tell us we ought to decontrol the price of natural gas, I guess I can't understand how Standard Oil or some of these producers can come in, whose aim is to have high prices for products and tell me that if we decontrol, we're going to lower the price of the products that they produce. It seems to me, say, Standard Oil comes in, they have a responsibility to their stockholders to get the highest price possible but yet they tell us to decontrol and it will cause the price of their product to go down. It just doesn't seem to make sense to me that these companies are willing to decontrol to lower the price of the product that they're producing.

Mr. Wulff: There's a little bit of inconsistency there, I think that you would reconcile it this way. The large companies would tend to get some short term benefit from decontrol because the large companies tend to have the lower priced gas. So, on a short term basis, from gas production earnings for a Standard of Indiana ought to be a little higher under decontrol, not by a lot, but by 10 or 15%, something like that. On a long term basis, the mentality is that at the larger companies, most of them are Republicans rather than Democrats, their

mentality is that the fewer regulations, the more efficient a business will be, the more efficient the economy will be, so maybe it's a broader objective...

Senator Chaney: You're trying to tell me that Standard is more interested in efficiency than product?

Mr. Wulff: Standard of Indiana is at least as much interested in economic efficiency on a broad basis as they are in their own profit, provided their profit is high enough. I take the view that decontrol of gas in the end would even put pressure on international oil prices, that with less restrictions and a freer competition, the gas producers would move all the gas they can. All the gas producers have to do is undercut international oil prices by a small amount to move a lot more gas. And if that's successful, we'll import less oil. If we import less oil, there's less support to the international oil price structure.

Chairman Angell: Well, that's the end of our hour and it was a short hour. It's a long way to come for an hour, but we do appreciate your being here.