

ALASKA LEGISLATURE COMMITTEE FILES, 1989-1990 8672  
6566 SENATE RESOURCES

970

lower oil prices, the ratio of after-tax income to total revenues dropped only slightly. The sharp drop in the after-tax income margin for Alaska operations compared to foreign operations may reflect two factors. First, the higher cost of transporting Alaska North Slope ("ANS") crude oil to refineries through the TAPS and then ocean transportation magnifies the impact of oil prices on ANS wellhead values. Stated differently, if the FAS 69 information consolidated the results of TAPS with ANS production, the ratio of income after taxes to total revenues would not have fallen so sharply.

Second, many foreign countries have entered into various risk-sharing agreements with oil and gas producers under which a significant portion of government revenues are calculated as a percentage of net profits -- wellhead values minus lifting and other costs -- rather than gross revenues. Risk-sharing agreements allow foreign governments to collect more revenue when oil prices are high, but reduce their revenues when oil prices are low. Consequently, the companies' ratio of income after taxes to gross revenues do not vary so sharply as oil prices fluctuate.

RESULTS OF FOREIGN OIL & GAS PRODUCING ACTIVITIES  
AMOCO, 1983-87

<u>Producing Area</u>	<u>Year</u>	<u>Total Revenue</u>	<u>Income Before Tax</u>	<u>Income Tax</u>	<u>Income After Tax</u>	<u>After-Tax Income/Revenues</u>
Canada	1987	549	237	120	117	21.3%
Europe	1987	447	49	40	9	2.0%
Other	1987	2,021	733	406	327	16.2%
Canada	1986	521	204	89	115	22.1%
Europe	1986	430	102	63	33	7.7%
Other	1986	1,795	419	316	103	5.7%
Canada	1985	737	382	245	137	18.6%
Europe	1985	575	180	93	87	15.1%
Other	1985	3,146	1,281	732	549	17.5%
Canada	1984	727	320	216	104	14.3%
Europe	1984	579	253	59	194	33.5%
Other	1984	3,349	1,294	665	629	18.8%
Canada	1983	719	374	229	145	20.2%
Europe	1983	421	133	59	74	17.6%
<u>Other</u>	<u>1983</u>	<u>2,850</u>	<u>1,127</u>	<u>541</u>	<u>586</u>	<u>20.6%</u>
Foreign	1987	3,017	1,019	566	453	15.0%
Foreign	1986	2,746	725	474	251	9.1%
Foreign	1985	4,458	1,843	1,070	773	17.3%
Foreign	1984	4,655	1,867	940	927	19.9%
Foreign	1983	3,990	1,634	829	805	20.2%
Foreign	1983-87	18,866	7,088	3,879	3,209	17.0%

RESULTS OF FOREIGN OIL & GAS PRODUCING ACTIVITIES  
ARCO, 1983-87

<u>Producing Area</u>	<u>Year</u>	<u>Total Revenue</u>	<u>Income Before Tax</u>	<u>Income Tax</u>	<u>Income After Tax</u>	<u>After-Tax Income/Revenues</u>
Foreign	1987	573	90	77	13	2.3%
Foreign	1986	456	43	29	14	3.1%
Foreign	1985	674	96	95	1	0.1%
Foreign	1984	618	117	108	9	1.5%
<u>Foreign</u>	<u>1983</u>	<u>468</u>	<u>11</u>	<u>21</u>	<u>(10)</u>	<u>-2.1%</u>
Foreign	1983-87	2,789	357	330	27	1.0%

RESULTS OF FOREIGN OIL & GAS PRODUCING ACTIVITIES  
CHEVRON, 1983-87

<u>Producing Area</u>	<u>Year</u>	<u>Total Revenue</u>	<u>Income Before Tax</u>	<u>Income Tax</u>	<u>Income After Tax</u>	<u>After-Tax Income/Revenues</u>
Canada	1987	476	259	130	129	27.1%
Canada	1986	353	117	66	51	14.4%
Canada	1985	1,148	542	347	195	17.0%
Canada	1984	1,309	669	440	229	17.5%
Canada	1983	696	352	248	104	14.9%
Africa	1987	1,160	958	587	371	32.0%
Africa	1986	913	517	403	114	12.5%
Africa	1985	1,649	1,446	1,307	139	8.4%
Africa	1984	1,037	923	786	137	13.2%
Africa	1983	82	(57)	63	(120)	-146.3%
Other	1987	978	530	224	306	31.3%
Other	1986	895	239	176	63	7.0%
Other	1985	1,494	789	719	70	4.7%
Other	1984	1,271	865	629	236	18.6%
<u>Other</u>	<u>1983</u>	<u>930</u>	<u>599</u>	<u>423</u>	<u>176</u>	<u>18.9%</u>
Foreign	1987	2,614	1,747	941	806	30.8%
Foreign	1986	2,161	873	645	228	10.6%
Foreign	1985	4,291	2,777	2,373	404	9.4%
Foreign	1984	3,617	2,457	1,855	602	16.6%
Foreign	1983	1,708	894	734	160	9.4%
Foreign	1983-87	14,391	8,748	6,548	2,200	15.3%

RESULTS OF FOREIGN OIL & GAS PRODUCING ACTIVITIES  
EXXON, 1983-87

<u>Producing Area</u>	<u>Year</u>	<u>Total Revenue</u>	<u>Income Before Tax</u>	<u>Income Tax</u>	<u>Income After Tax</u>	<u>After-Tax Income/Revenues</u>
Canada	1987	965	504	209	295	30.6%
Other Western Hemisphere	1987	80	16	11	5	6.3%
Europe	1987	3,762	1,806	691	1,115	29.6%
Middle East & Africa	1987	82	(51)	12	(63)	-76.8%
Australia & Far East	1987	2,431	878	478	400	16.5%
Canada	1986	755	264	109	155	20.5%
Other Western Hemisphere	1986	62	(18)	2	(20)	-32.3%
Europe	1986	3,499	1,611	553	1,058	30.2%
Middle East & Africa	1986	62	(72)	5	(77)	-124.2%
Australia & Far East	1986	1,991	543	240	303	15.2%
Canada	1985	1,041	508	228	280	26.9%
Other Western Hemisphere	1985	98	(4)	1	(5)	-5.1%
Europe	1985	5,108	3,431	2,088	1,343	26.3%
Middle East & Africa	1985	30	(62)	3	(65)	-216.7%
Australia & Far East	1985	3,583	1,154	590	564	15.7%
Canada	1984	930	507	300	207	22.3%
Other Western Hemisphere	1984	94	(3)	(5)	2	2.1%
Europe	1984	5,159	3,793	2,506	1,287	24.9%
Middle East & Africa	1984	39	(6)	5	(11)	-28.2%
Australia & Far East	1984	3,607	1,206	589	617	17.1%
Canada	1983	937	497	316	181	19.3%
Other Western Hemisphere	1983	72	(77)	0	(77)	-106.9%
Europe	1983	4,680	3,353	2,262	1,091	23.3%
Middle East & Africa	1983	45	(6)	3	(9)	-20.0%
Australia & Far East	1983	3,086	924	477	447	14.5%
Foreign	1987	7,320	3,153	1,401	1,752	23.9%
Foreign	1986	6,369	2,328	909	1,419	22.3%
Foreign	1985	9,860	5,027	2,910	2,117	21.5%
Foreign	1984	9,829	5,497	3,395	2,102	21.4%
Foreign	1983	8,820	4,691	3,058	1,633	18.5%
Foreign	1983-87	42,198	20,696	11,673	9,023	21.4%

**RESULTS OF FOREIGN OIL & GAS PRODUCING ACTIVITIES  
MOBIL, 1983-87**

Producing Area	Year	Total Revenue	Income Before Tax	Income Tax	Income After Tax	After-Tax Income/Revenues
Foreign	1987	5,618	2,302	1,262	1,040	18.5%
Canada	1986	541	138	95	43	7.9%
Europe	1986	1,534	573	305	268	17.5%
Other	1986	1,519	1,233	732	501	33.0%
Canada	1985	974	495	356	139	14.3%
Europe	1985	2,193	1,171	839	332	15.1%
Other	1985	3,096	2,306	1,734	572	18.5%
Canada	1984	820	444	308	136	16.6%
Europe	1984	1,978	1,092	802	290	14.7%
Other	1984	2,453	1,836	1,373	463	18.9%
Canada	1983	643	368	262	106	16.5%
Europe	1983	1,670	879	633	246	14.7%
Other	1983	2,114	1,464	1,135	329	15.6%
Foreign	1987	5,618	2,302	1,262	1,040	18.5%
Foreign	1986	3,594	1,944	1,132	812	22.6%
Foreign	1985	6,263	3,972	2,929	1,043	16.7%
Foreign	1984	5,251	3,372	2,483	889	16.9%
Foreign	1983	4,427	2,711	2,030	681	15.4%
Foreign	1983-87	25,153	14,301	9,836	4,465	17.8%

RESULTS OF FOREIGN OIL & GAS PRODUCING ACTIVITIES  
OCCIDENTAL, 1983-87

Producing Area	Year	Total Revenue	Income Before Tax	Income Tax	Income After Tax	After-Tax Income/ Revenues
Other Western Hemisphere	1987	568	108	144	(36)	-6.3%
Eastern Hemisphere	1987	629	424	347	77	12.2%
Other Western Hemisphere	1986	486	73	74	(1)	-0.2%
Eastern Hemisphere	1986	550	265	254	11	2.0%
Other Western Hemisphere	1985	422	(26)	87	(113)	-26.8%
Eastern Hemisphere	1985	1,358	663	542	121	8.9%
Other Western Hemisphere	1984	574	145	65	80	13.9%
Eastern Hemisphere	1984	1,572	734	633	101	6.4%
Other Western Hemisphere	1983	640	185	126	59	9.2%
<u>Eastern Hemisphere</u>	<u>1983</u>	<u>1,762</u>	<u>820</u>	<u>740</u>	<u>80</u>	<u>4.5%</u>
Foreign	1987	1,197	532	491	41	3.4%
Foreign	1986	1,036	338	328	10	1.0%
Foreign	1985	1,780	637	629	8	0.4%
Foreign	1984	2,146	879	698	181	8.4%
Foreign	1983	2,402	1,005	866	139	5.8%
Foreign	1983-87	8,561	3,391	3,012	379	4.4%

RESULTS OF FOREIGN OIL & GAS PRODUCING ACTIVITIES  
PHILLIPS, 1983-87

<u>Producing Area</u>	<u>Year</u>	<u>Total Revenue</u>	<u>Income Before Tax</u>	<u>Income Tax</u>	<u>Income After Tax</u>	<u>After-Tax Income/Revenues</u>
Norway	1987	613	192	116	76	12.4%
United Kingdom	1987	174	76	27	49	28.2%
Africa	1987	171	109	82	27	15.8%
Other Foreign	1987	72	(8)	1	(9)	-12.5%
Norway	1986	731	364	279	85	11.6%
United Kingdom	1986	152	27	11	16	10.5%
Africa	1986	142	(55)	53	(108)	-76.1%
Other Foreign	1986	53	(1)	0	(1)	-1.9%
Norway	1985	1,227	847	672	175	14.3%
United Kingdom	1985	261	127	70	57	21.8%
Africa	1985	327	183	201	(18)	-5.5%
Other Foreign	1985	88	(7)	9	(16)	-18.2%
Norway	1984	1,383	983	806	177	12.8%
United Kingdom	1984	284	129	107	22	7.7%
Africa	1984	318	177	184	(7)	-2.2%
Other Foreign	1984	89	(45)	1	(46)	-51.7%
Norway	1983	1,598	1,308	1,058	250	15.6%
United Kingdom	1983	85	20	(4)	24	28.2%
Africa	1983	292	91	172	(81)	-27.7%
<u>Other Foreign</u>	<u>1983</u>	<u>80</u>	<u>(67)</u>	<u>3</u>	<u>(70)</u>	<u>-87.5%</u>
Foreign	1987	1,030	369	226	143	13.9%
Foreign	1986	1,078	335	343	(8)	-0.7%
Foreign	1985	1,903	1,150	952	198	10.4%
Foreign	1984	2,074	1,244	1,098	146	7.0%
Foreign	1983	2,055	1,352	1,229	123	6.0%
Foreign	1983-87	8,140	4,450	3,848	602	7.4%

**RESULTS OF FOREIGN OIL & GAS PRODUCING ACTIVITIES  
SHELL, 1983-87**

<u>Producing Area</u>	<u>Year</u>	<u>Total Revenue</u>	<u>Income Before Tax</u>	<u>Income Tax</u>	<u>Income After Tax</u>	<u>After-Tax Income/Revenues</u>
Foreign	1987	193	4	2	2	1.0%
Foreign	1986	122	(5)	31	(36)	-29.5%
Foreign	1985	130	(47)	12	(59)	-45.4%
Foreign	1984	116	(20)	6	(26)	-22.4%
<u>Foreign</u>	<u>1983</u>	<u>150</u>	<u>(9)</u>	<u>3</u>	<u>(12)</u>	<u>-8.0%</u>
Foreign	1983-87	711	(77)	54	(131)	-18.4%

**RESULTS OF FOREIGN OIL & GAS PRODUCING ACTIVITIES**  
**TEXACO, 1983-87**

<u>Producing Area</u>	<u>Year</u>	<u>Total Revenue</u>	<u>Income Before Tax</u>	<u>Income Tax</u>	<u>Income After Tax</u>	<u>After-Tax Income/Revenues</u>
Canada	1987	534	294	143	151	28.3%
Other Western Hemisphere	1987	331	194	161	33	10.0%
Europe	1987	1,150	511	286	225	19.6%
Other Eastern Hemisphere	1987	718	433	411	22	3.1%
Canada	1986	504	238	131	107	21.2%
Other Western Hemisphere	1986	426	248	212	36	8.5%
Europe	1986	818	259	231	28	3.4%
Other Eastern Hemisphere	1986	598	309	267	42	7.0%
Canada	1985	952	555	338	217	22.8%
Other Western Hemisphere	1985	733	526	415	111	15.1%
Europe	1985	1,493	669	523	146	9.8%
Other Eastern Hemisphere	1985	1,094	769	718	51	4.7%
Canada	1984	1,088	696	401	295	27.1%
Other Western Hemisphere	1984	734	498	399	99	13.5%
Europe	1984	1,221	557	475	82	6.7%
Other Eastern Hemisphere	1984	1,232	904	812	92	7.5%
Canada	1983	978	659	374	285	29.1%
Other Western Hemisphere	1983	705	472	380	92	13.0%
Europe	1983	493	(2)	37	(39)	-7.9%
<u>Other Eastern Hemisphere</u>	<u>1983</u>	<u>667</u>	<u>400</u>	<u>396</u>	<u>84</u>	<u>12.6%</u>
Foreign	1987	2,733	1,432	1,001	431	15.8%
Foreign	1986	2,346	1,054	841	213	9.1%
Foreign	1985	4,272	2,519	1,994	525	12.3%
Foreign	1984	4,275	2,655	2,087	568	13.3%
Foreign	1983	2,843	1,609	1,187	422	14.8%
Foreign	1983-87	16,469	9,269	7,110	2,159	13.1%

RESULTS OF FOREIGN OIL & GAS PRODUCING ACTIVITIES  
TENNECO, 1983-87

Producing Area	Year	Total Revenue	Income Before Tax	Income Tax	Income After Tax	After-Tax Income/Revenues
Colombia	1987	130	44	30	14	10.8%
Other Foreign	1987	47	(39)	1	(40)	-85.1%
Colombia	1986	109	36	27	9	8.3%
Other Foreign	1986	36	(122)	(48)	(74)	-205.6%
Colombia	1985	153	86	22	64	41.8%
Other Foreign	1985	83	(19)	0	(19)	-22.9%
Colombia	1984	139	91	33	58	41.7%
Other Foreign	1984	88	6	2	4	4.5%
Colombia	1983	147	113	46	67	45.6%
<u>Other Foreign</u>	<u>1983</u>	<u>101</u>	<u>40</u>	<u>24</u>	<u>16</u>	<u>15.8%</u>
Foreign	1987	177	5	31	(26)	-14.7%
Foreign	1986	145	(86)	(21)	(65)	-44.8%
Foreign	1985	236	67	22	45	19.1%
Foreign	1984	227	97	35	62	27.3%
Foreign	1983	248	153	70	83	33.5%
Foreign	1983-87	1,033	236	137	99	9.6%

## CASE 1

### HOW THE ELF IS CALCULATED

$$\text{ELF} = (1 - [\text{PEL}/\text{TP}])\text{exp}(460*\text{WD}/\text{PEL})$$

PEL = (Production at the Economic Limit) =  
(300 barrels per day)\*  
(average number of operating wells during the month)\*  
(number of days of production for the month).

#### EXAMPLE

$$\text{PEL} = 300 \text{ barrels} * 541 \text{ wells} * 30 \text{ days} = 4,869,000 \text{ barrels per month}$$

TP = (Total Production for the field for the month) =  
(average number of operating wells during the month)\*  
(number of days of production for the month)\*  
(average daily production per well).

#### EXAMPLE

$$\text{TP} = 541 \text{ wells} * 30 \text{ days} * 2477 \text{ barrels per well} = 40,201,710 \text{ barrels per month}$$

WD = (Well Days) =  
(number of operating wells during the month)\*  
(number of days each well operates)

#### EXAMPLE

$$\text{WD} = 541 \text{ wells} * 30 \text{ days} = 16,230 \text{ well days}$$

### CALCULATION EXAMPLE

$$\text{ELF} = (1 - [ \text{PEL} / \text{TP} ]) \text{exp}(460 * \text{WD} / \text{PEL} )$$

$$\text{ELF} = (1 - [4,869,000/40,201,710])\text{exp}(460*16,230/4,869,000)$$

$$\text{ELF} = (1 - .1211) \quad \text{exp} \quad (1.533)$$

$$\text{ELF} = (.8789) \quad \text{exp} \quad (1.533)$$

$$\text{ELF} = .82$$

Original sponsor: Finance Committee

1 IN THE HOUSE BY THE JUDICIARY COMMITTEE  
2 SENATE CS FOR CS FOR HOUSE BILL NO. 118 (Judiciary)  
3 IN THE LEGISLATURE OF THE STATE OF ALASKA  
4 SIXTEENTH LEGISLATURE - FIRST SESSION

5 A BILL

6 For an Act entitled: "An Act relating to the oil and gas properties pro-  
7 duction tax."

8 BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF ALASKA:

9 \* Section 1. AS 43.55.013(b) is repealed and reenacted to read:

10 (b) The economic limit factor for oil production of a lease or  
11 property shall be computed according to the following formula:

12  $(1 - [PEL/TP]) \exp ([150,000/(TP/Days)] \exp [(460 \times WD)/PEL])$

13 where: PEL = the monthly production rate at the economic limit;

14 TP = the total production during the month for which the  
15 tax is to be paid;

16 WD = the total number of well days in the month for which  
17 the tax is to be paid;

18 Days = the number of days in the month for which the tax is  
19 to be paid; and

20 exp = exponent.

21 \* Sec. 2. AS 43.55.013(d) is repealed and reenacted to read:

22 (d) The monthly production rate at the economic limit for a  
23 lease or property is 300 barrels times the number of well days for the  
24 lease or property during the month for which the tax is to be paid.

25 \* Sec. 3. AS 43.55.013(e) and 43.55.013(f) are repealed.

# MEMORANDUM

State of Alaska  
Office of the Governor  
Division of Policy

TO: The Hon. Alyce Hanley      DATE: April 20, 1989  
FROM: Gregg Erickson  
SUBJECT: Corporate Profits Earned Alaska

During the March hearings on the ELF legislation in the House you requested information on the net income earned by the fishing industry.

Based on tax data from the Department of Revenue, we estimate that 1987 taxable corporate net income in Alaska totaled \$2.010 billion. Of this, \$24 million (1.2 percent) was earned by corporations in fishing or fishing related fields.

Based on Dept. of Revenue data, we estimate taxable oil company income at \$1.681 billion, or 84 percent of the total.

Taxable income may differ substantially from the income shown on a company's books of account. This is especially true under the special taxation arrangements adopted for the oil industry by Alaska in 1981. The recent study by Professor Deakin found that 1987 oil industry net income totaled \$3.182 billion. Based on the Deakin analysis, it is likely that the oil industry accounts for more than 90 percent of total book income attributable to Alaska. The figure cannot be determined precisely, however, because comparable figures for non-petroleum book income are not available for the state.

cc: Senate Special Oil and Gas Committee

Original sponsor: Finance Committee

1 IN THE HOUSE BY THE JUDICIARY COMMITTEE  
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13 where: PEL = the monthly production rate at the economic limit;  
14 TP = the total production during the month for which the  
15 tax is to be paid;  
16 WD = the total number of well days in the month for which  
17 the tax is to be paid;  
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24 lease or property during the month for which the tax is to be paid.  
25 \* Sec. 3. AS 43.55.013(e) and 43.55.013(f) are repealed.

Table 2. The Effect of Changing the Portion of Contributions to the Permanent Fund Now Set at 25% and ELF Under SB 97 (Millions \$)

Fiscal Year	ELF SB 97 (Column A)	PF @ 25% Current Contribution (Column B)	PF Royalty + ELF (Column A + B)	PF @ 35%	PF @ 37.5%	PF @ 40%	PF @ 42.5%	PF @ 45%	PF @ 47.5%	PF @ 50%
1990	149	232	381	324	347	370	394	417	440	463
1991	156	230	386	321	344	367	390	413	436	459
1992	165	228	393	320	342	365	388	411	434	456
1993	178	229	407	321	344	367	390	413	435	458
1994	178	221	399	310	332	354	376	398	420	442
1995	167	204	371	285	306	326	346	367	387	408
1996	154	190	344	266	285	304	323	342	361	380
1997	140	179	319	251	269	287	305	323	341	359
1998	130	172	302	241	258	275	292	309	326	344
1999	118	157	275	220	236	251	267	283	298	314
2000	105	144	249	201	216	230	244	259	273	287
<b>TOTAL</b>	<b>1640</b>	<b>2,185</b>	<b>3,825</b>	<b>3,060</b>	<b>3,278</b>	<b>3,497</b>	<b>3,715</b>	<b>3,934</b>	<b>4,152</b>	<b>4,371</b>

Source: Alaska Department of Revenue Spring Forecast  
 Prepared by Senate Advisory Council April 13, 1989

These amounts represent only that portion of the royalty contribution to the Permanent Fund that is currently contributed at a rate of 25%. The royalty rate for other contributions is 50%.

Revenues Raised by ELF Formula Using Different  
Constants in the Formula Exponent

CONSTANT	(\$mm)			
	150,000 (current HB 118)	200,000	250,000	300,000
1990	171	155	139	121
1991	181	162	142	123
1992	192	169	147	127
1993	207	179	154	131
1994	207	177	151	130
1995	194	163	138	121
1996	180	151	130	114
1997	165	140	123	109
1998	157	136	118	101
1999	148	125	105	85
2000	<u>139</u>	<u>115</u>	<u>92</u>	<u>69</u>
	1,941	1,672	1,439	1,231

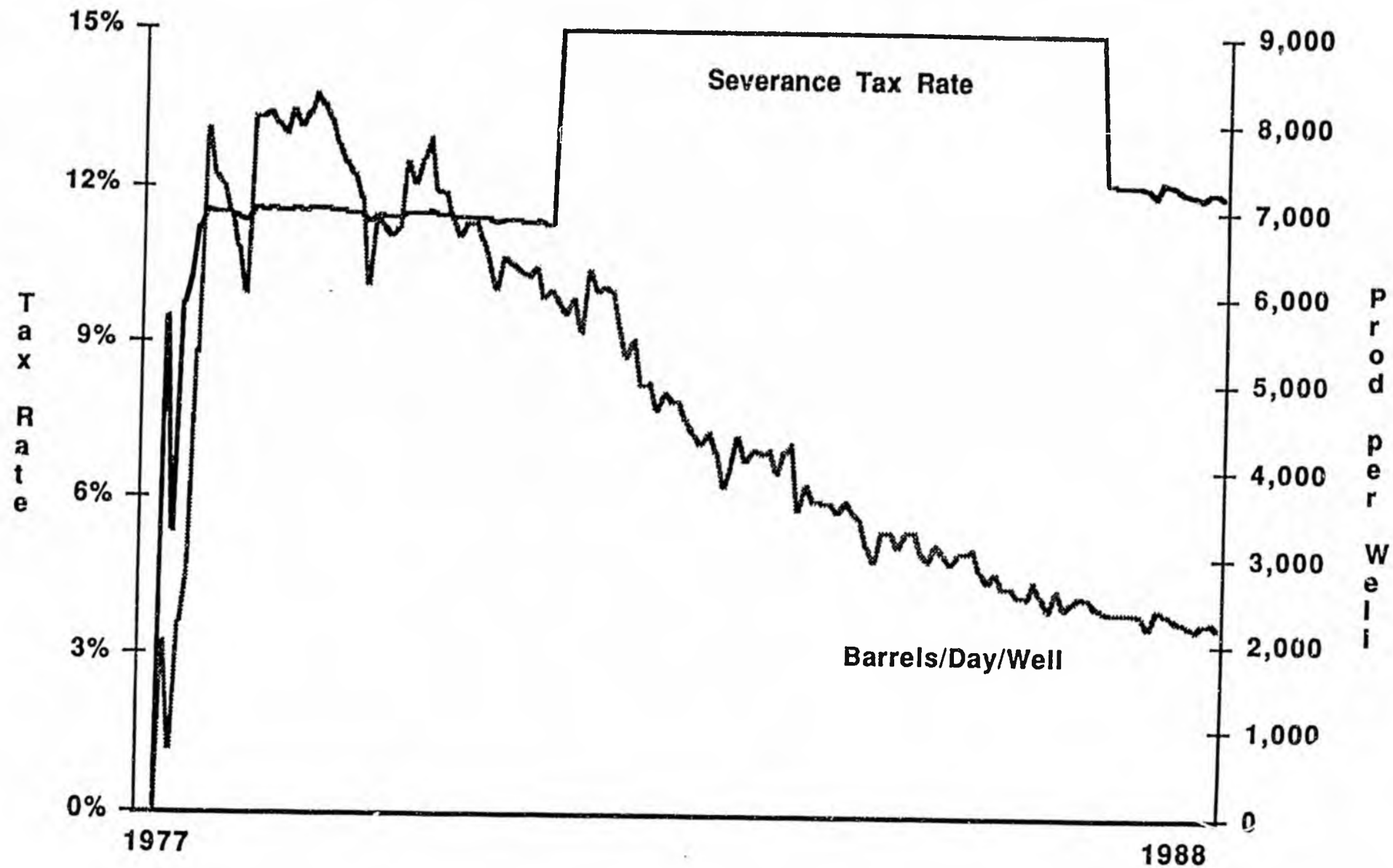
- This analysis assumes that the legislation applies to oil produced after May 31, 1989.

- Projections based on March 31, 1989 mid-case revenue scenario.

- These show the totals raised under four different constants in the exponent of the formula. SCS CSHB 118 (Judiciary) uses the 150,000 constant.

- This analysis was done at the request of legislative staff. The Department opposes changing the 150,000 constant term.

# Prudhoe Bay Per Well Production vs. Severance Tax Rate



THE ECONOMIC LIMIT FACTOR  
IN ALASKA'S OIL AND GAS PROPERTIES  
PRODUCTION TAX

By Thomas K. Williams

September 1986

### About the Author

Thomas K. Williams may rightfully lay claim to being the "father of the ELF" since he was the one who first proposed the idea of an economic limit factor for the production tax in late 1976, when he was Director of Petroleum Revenue for the Alaska Department of Revenue. As director, he had immediate responsibility for administering the state's oil and gas tax laws, and he drafted many of the regulations that are still in effect for those taxes. Mr. Williams was director from September 1975 until April 1979, when he became Commissioner of Revenue for the remainder of Governor Hammond's second term. Prior to joining Revenue Mr. Williams was an Assistant Attorney General for the state, specializing in oil and gas matters. He is currently Vice President and General Counsel of Cook Inlet Region, Inc. Mr. Williams received bachelor's and master's degrees in history from Princeton and Harvard, respectively, and earned his law degree at Stanford. He has lived in Alaska since 1973.

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## WHAT IS THE ELF?

The Economic Limit Factor, or ELF, is a mathematical formula that changes the rate of tax on oil and gas production under Alaska's Oil and Gas Properties Production Tax (the "Production Tax"), AS 43.55. Without the ELF, these rates would be the nominal rates set out in the statute -- 15 percent 1/ of the value of taxable oil production 2/ (12.25% during the first five years of production from a lease or property 3/) or \$0.80 per barrel, 4/ whichever is greater. 5/ The \$0.80 cents-per-barrel amount is for oil having an API gravity of 27 degrees, and it is increased or decreased by half a cent for each degree above or below 27 degrees, respectively, in the API gravity of the actual oil produced. 6/ This adjustment to the cents-per-barrel amount

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- 1/ AS 43.55.011(b) (15 percent rate for oil produced after June 30, 1981).
  - 2/ AS 43.55.011(a) excludes "any oil the ownership or right to which is exempt from taxation". Such exempt oil almost invariably is state or federal royalty oil.
  - 3/ AS 43.55.011(b) ("for a lease or property coming into commercial production after June 30, 1981, the percentage-of-value amount equals 12.25 percent of the gross value . . . of taxable oil produced from the lease or property in the first five years after the start of commercial production and equals 15 percent . . . thereafter").
  - 4/ AS 43.55.011(c). This statute also specifies a cents-per-barrel rate of \$0.60 for "taxable old crude oil", referring to "old oil" under former federal oil price controls. With the expiration of those controls, there is no longer any current production to which the \$0.60 rate applies.
  - 5/ AS 43.55.011(a) requires payment of the Production Tax on the basis of the greater amount, with the percentage-of-value amount deemed to be the greater if both amounts happen to be equal. It used to be necessary to establish which amount was being used when both amounts were equal because former AS 43.55.011(d) (repealed by § 18, ch. 116, SLA 1981) called for certain payments into the Alaska Native Fund when the Production Tax was paid on the cents-per-barrel basis.
  - 6/ AS 43.55.012(b).

for API gravity is made before the ELF is applied. 7/ For taxable gas, the nominal tax rate is greater of ten percent of its value or \$0.064 per thousand cubic feet (Mcf) 8/ before applying the ELF.

The ELF ranges in value from zero to one, although the way the formula is set up, it could approach, but never actually reach, one. However, by statute, if the calculated value of the ELF under the formula is greater than 0.7 for oil during the first ten years of production from a lease or property, then the ELF is defined to have a value of one; 9/ after ten years of production, the ELF equals its calculated amount under the formula, whether it is above or below 0.7. 10/ There is no corresponding rule changing the value of the ELF for gas from its calculated value under the gas ELF formula. 11/

The actual tax rate for taxable production from a lease or property equals the nominal tax rate multiplied by the ELF for that lease or property. Thus for instance, with oil, as the ELF varies from one down to zero, the effective

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7/ Under AS 43.55.011(a) "[t]he tax is equal to either the percentage-of-value amount calculated under (b) of this section or the cents-per-barrel amount calculated under (c) of this section, whichever is greater, multiplied by the economic limit factor". AS 43.44.011(c) states "[t]he cents-per-barrel amount equals . . . \$0.80 per barrel . . . as adjusted by AS 43.55.012 [providing for the API gravity adjustment]". Thus, the API gravity adjustment applies in determining the cents-per-barrel amount under "(c) of this section", and then, if that amount is greater than the percentage-of-value amount, it is multiplied by the ELF.

8/ AS 43.55.016. The reference in AS 43.55.016(c) to an "adjust[ment] by AS 43.55.012" in the \$0.064 cents-per-Mcf rate refers to provisions in AS 43.55.012 that have since been repealed. AS 43.55.012(b), the only portion of AS 43.55.012 currently remaining in effect, is applicable only to oil. The reference to AS 43.55.012 is therefore an artifact from prior versions of the statute and no longer has any application; the cents-per-Mcf rate is uniformly \$0.064 per Mcf (before applying the ELF).

9/ AS 43.55.013(b)(3).

10/ AS 43.55.013(b)(4).

11/ AS 43.55.013(c).

rate of tax can range between something at or very near its nominal rate of 15 percent (or \$0.80 per barrel, if greater), down to zero. 12/

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12/ The cents-per-barrel and cents-per-Mcf rates represent, in effect, floors on the prices used for Production Tax purposes. If prices drop below these floor levels, the cents-per-barrel or cents-per-Mcf rate kicks in. However, neither of these represents any sort of floor on the actual amount of tax collected. As explained below, the purpose of the ELF is to scale down the burden of the Production Tax so that the tax does not cause the cessation of production before the property would otherwise reach its economic limit (break even point). If the amount of production needed to break even equals the amount currently being produced, the ELF makes the tax zero whether the tax is calculated on a percentage-of-value basis or on the cents-per-barrel (or cents-per-Mcf) basis.

## HOW THE ELF WORKS: THE BASIC THEME

The ELF depends primarily on two things. One is the volume of production needed to "break even" so that the gross value of the production just equals the total direct operating costs (as defined in the statute) for producing that oil or gas. The other is the volume of production actually produced during the month in question.

These two factors have a determinative role in the changing economics of an oil and gas property during its productive life, and the ELF attempts to recognize the economics and set the effective tax rate at appropriate levels throughout that productive life. In general the cost of producing an additional barrel or oil or an Mcf of gas starts off relatively low and increases with time, until eventually the cost of getting the next barrel or Mcf gets so high that it is no longer profitable to continue producing. This point at which operations cease to be profitable is called the economic limit.

The ELF, which gets its name (Economic Limit Factor) from this concept of an economic limit, takes an approximation of how much production is needed to break even at the economic limit, 13/ and then compares that production rate

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13/ The statute makes an approximation of the operating costs at the economic limit by specifically listing certain types of operating costs that one would reasonably expect to continue being incurred right up until the economic limit is reached. Such costs are "royalty, production supplies, purchased fuel, routine maintenance, and wages and benefits of employees working on the production operations." AS 43.55.013(e) (oil); AS 43.55.013(h) (gas). Other current costs are specifically excluded from the calculation of the operating costs at the economic limit because one would reasonably expect them to have been discontinued or no longer incurred by the time the economic limit is reached. These excluded costs are capital expenditures, tangible or intangible drilling expenses, costs of well workovers, and costs of replacement or repairs other than routine maintenance. All of these are excluded because they represent expenses or capital investments that a reasonable person would have discontinued making once the property got close enough to its economic limit that the additional cost or investment no longer promised to pay for itself. Amortization and depreciation are excluded because all past capital investments ordinarily should be fully amortized or depreciated before

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at the economic limit (PEL) to the volume actually being produced. This ratio is an indicator of the profitability of the lease or property. The smaller PEL is in proportion to the total production (TP) currently being produced, the more profitable the lease or property is and, theoretically, the better it can bear a greater "slice off the top" for the Production Tax. Hence the ELF approaches one (and the effective tax rate approaches its maximum possible rate) when the property is most profitable, but later as the property becomes more and more expensive to operate and less and less profitable, the ELF decreases and scales down the tax rate, until finally both the ELF and the tax are zero when the economic limit is reached.

An example will illustrate exactly how this occurs. In its simplest form, the ELF is one minus the ratio of PEL to TP. Put into algebraic terms, the formula for the ELF is:

$$\text{ELF} = 1 - [\text{PEL}/\text{TP}],$$

where PEL is the production rate needed to cover the projected direct operating costs at the economic limit, and TP is total current production. This is the present formula

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the property reaches its economic limit. Taxes are excluded because (a) the ELF would have reduced the Production Tax to zero when the property reaches the economic limit and (b) ad valorem taxes, even on a replacement-cost basis of assessment, should reflect the fact that there is no remaining economic life for the assets and hence they would be fully depreciated for assessment purposes at the economic limit (the third tax, the conservation tax of one eighth of a cent per barrel, AS 43.57, is disregarded as having a minimal effect). Insurance and overhead are excluded because they were not considered to be sufficiently "direct" in nature. The costs of terminating production operations and shutting down the property are excluded because they are not costs of production, but costs of ceasing production; if anything, the financial advantage (due to the time value of money) to be gained by deferring the termination costs might be enough in itself to induce an operator to continue producing a property even after it reaches what would ordinarily be its economic limit (i.e., after its production revenue started falling short of the direct operating expenses for continuing that production). The statute also allows the Department of Revenue to adopt regulations that include additional direct operating costs that are not specifically set out in the statute; the Department has adopted no regulation including any such additional types of cost.

for the gas ELF 14/ (formerly, when there were still federal oil price controls, it was also the formula for "old oil" production 15/).

Suppose there is a gas-producing property for which the PEL is determined to be 150,000 Mcf per month. Suppose further that initial production from this property is 500,000 Mcf per month. The ELF will be:

$$\begin{aligned} \text{ELF} &= 1 - [\text{PEL}/\text{TP}] \\ &= 1 - [150,000/500,000] \\ &= 1 - [0.300000] \\ &= 0.700000 \end{aligned}$$

The effective rate of tax will be seven percent of the value of the gas (0.700000 times the nominal rate of 10% equals 7%) or \$0.0448 per Mcf (0.700000 times the nominal rate of \$0.064 equals \$0.0448), whichever is more.

Now suppose the property continues producing at 500,000 Mcf per month for five years, and then, starting in year six and each year thereafter, the rate of monthly production drops by 70,000 Mcf. The following table shows what the ELF and the effective tax rates will be during the life of this property:

Year	Production Rate	ELF	Effective Tax Rate	
			% of Value	\$ per Mcf
1 - 5	500,000	0.700000	7.00000%	\$0.044800
6	430,000	0.651163	6.51163	0.041674
7	360,000	0.583333	5.83333	0.037333
8	290,000	0.482759	4.82759	0.030897
9	220,000	0.318182	3.18182	0.020364
10	150,000	0.000000	-0-	-0-

14/ Id. ("The economic limit factor for gas production of a lease or property equals one minus the ratio of the monthly production rate at the economic limit to the production during the month for which the tax is to be paid").

15/ Former AS 43.55.013(a), repealed by § 18, ch. 116, SLA 1981 ("The economic limit factor for old crude oil production of a lease or property equals one minus the ratio of the monthly production at the economic limit to the production during the month for which the tax is to be paid").

As one can see from this table, when current production starts to decline, the ELF starts falling off too, but at a somewhat slower rate. For example, between Years 5 and 6 production in this illustration falls from 500,000 to 430,000 Mcf, a drop of 14 percent (the drop of 70,000 is 14% of 500,000), but the ELF drops from 0.700000 to 0.651163, a decline of only 6.9767 percent (the change of 0.048837 in the ELF between Year 5 and Year 6 is 6.9767% of 0.700000). However, as the table clearly shows, the ELF eventually does fall off fast enough to get to zero when the economic limit is reached.

What this means in practical terms is that the ELF operates to keep the effective tax rate from initially falling off quite as rapidly as does the profitability of the property measured by the ratio of current production to production at the economic limit. Thus the State's Production Tax collections are higher than they would be if the ELF scaled the tax rate down in direct proportion to the property's profitability.

There is one other thing that this illustration reveals about the ELF, and that is why the effective tax rate cannot ever equal the nominal rates set out in the statute (except of course where there is a special statutory rule making the ELF one if its computed value under the formula is greater than 0.7). The reason is that the ELF itself can approach, but never quite reach, the value of one. For the ELF to equal one, the ratio of production at the economic limit to current production must be zero. 16/ In mathematical terms,

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16/ In the "complex" explanation of the ELF, the effects of the exponent in the oil ELF are explained. With the exponent, there is theoretically a second way for the ELF to equal one, and that is if the exponent is zero and the number to which the exponent is to be applied is not equal to zero. However, since the exponent is, in effect, the ratio of 460 barrels a day per well to the actual average daily production rate per well during the month in question, the exponent cannot be zero unless actual production were infinite (this is because 460 divided by any finite number, no matter how huge, will yield a number greater than zero; otherwise, if zero were the quotient, one would be able to reverse the process and multiply that huge but finite number by that quotient (zero) and get back to 460, but zero times any finite number is always zero). Since an infinite production rate is one of the two possible conditions that are described in the "simple" version of the ELF as making the ELF exactly equal to one, there is no practical difference between the "simple" and "complex" versions as to why the ELF is always less than one in the physical world.

if  $1 = ELF$ , then  $1 = 1 - [PEL/TP]$ .

Clearly,  $[PEL/TP]$  must equal zero for this equation to be true, since if any number other than zero is subtracted from one, the result will not equal one. Thus,

$$PEL/TP = 0, \text{ or}$$

multiplying both sides of this last equation by TP,

$$PEL = 0 \times TP.$$

There is no finite number for TP which will, when multiplied by zero, yield a value for PEL other than zero. This is because zero times any finite number is always zero. And so, if the ELF is to equal one, either current production (TP) is infinite (which is possible in mathematics, but not in the physical world) or PEL equals zero (again, a practical impossibility, since no field would have costs of production equal to zero, especially at its economic limit).

Thus, the larger current production becomes in proportion to PEL, the closer the ELF comes to a value of one, but it never reaches one under the formula in the real world.

## REASONS FOR THE ELF

The ELF operates to reduce the effective rate of the Production Tax as an oil and gas property nears its economic limit; i.e., the point where the income (gross value) from producing a barrel or Mcf of production from that property is just enough to cover the costs of producing that barrel or Mcf. At the end, when the property actually reaches its economic limit, the ELF makes the tax rate zero. Why has this ELF feature been included in the Production Tax?

The reasons for the ELF are both historical and economic. Prior to the enactment of the ELF in 1977, Alaska had a "stair stepped" Production Tax on oil in which the tax depended on the average daily rate of production per well. The first 300 barrels a day per well were taxed at five percent of their gross value, the next 700 barrels a day were taxed at six percent, and average daily production in excess of 1,000 barrels a day per well was taxed at eight percent. 17/ In addition, there were three similarly "stair

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17/ Former AS 43.55.010, repealed by § 9, ch. 136, SLA 1977. The three-tiered "stair step" tax (enacted in ch. 4, FSSLA 1973) replaced an earlier four-tier version, in which the four "stair steps" for percentage-of-value had been enacted first (ch. 247, SLA 1970), with the cents-per-barrel rates added later (ch. 101, SLA 1972). The four "steps" in the original progressive tax rate structure were 0 - 300 barrels a day per well (3% rate), 301 - 1,000 barrels a day per well (5% rate), 1,001 - 2,500 barrels a day per well (6% rate), and 2,500+ barrels a day per well (8% rate). When the cents-per-barrel rates were added to the Production Tax in 1972, they were coupled with a credit for royalty payments to the State, the intent and effect of which was to set a floor on combined state revenues from royalty and Production Tax, corresponding to a "wellhead" price of \$2.65 a barrel (which would have dropped to \$2.50 on July 1, 1980 if the law had remained in effect). If prices dropped under that floor, the "lost" royalty income would be made up by the corresponding reduction in the royalty credit against the cents-per-barrel rates. See ch. 101, SLA 1972; 1972 House J. 915-916 (Governor Egan's transmittal letter for House Bill 817, introducing the royalty credit concept; the House Finance Committee took the substance of HB 817 and incorporated it into a House Committee Substitute for a Senate Bill, SB 168, that had already passed the Senate; the version that became chapter 101 of the 1972 Session Laws was the Second Free Conference Committee

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stepped" cents-per-barrel rates -- \$0.16875 on the first 300 barrels a day, \$0.2025 on the next 700, and \$0.27 on anything over 1,000 barrels a day. 18/ These cents-per-barrel rates were for oil having an API gravity of 27 degrees, and they were increased or decreased by two percent for each degree of API gravity that the actual oil production was over or below 27 degrees. The actual tax to be paid was the higher of the two, percentage-of-value or cents-per-barrel. 19/ The cents-per-barrel amount would be greater when the "wellhead" price 20/ fell below \$3.375; for higher

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Substitute for SB 168, SFCCS HCS SB 168). Litigation over this and other enactments of the 1972 Legislature quickly ensued -- Amerada-Hess Corp., et al., v. State (Superior Ct. No. 72-2719 Civil), ARCO Pipe Line Co. v. Herbert (Superior Ct. No. 72-2798 Civil), Mobil Pipe Line Co. v. State (Superior Ct. No. 72-2720 Civil), consolidated. Legislation enacted by the 1973 Special Session, including repeal of the royalty credit provisions, made part of the litigation moot and allowed the remainder to be settled.

18/ Former AS 43.55.015(a), repealed by § 9, ch. 136, SLA 1977. Actually, the base cents-per-barrel rates (before any adjustment for API gravity) were not constant, but changed from month to month based on monthly changes in the Wholesale Price Index for crude petroleum from the Index for the month of December 1973. See former AS 43.55.015(c); Union Oil Co. of Cal. v. Dept. of Revenue, 560 P.2d 21 (Alaska 1977) (upholding the Department's regulation, former 15 AAC 05.694, which made the December 1973 Index the base Index). This monthly adjustment to the cents-per-barrel rates, in turn, meant that the effective floor price for the Production Tax revenue (i.e., the price at which the cents-per-barrel tax became greater than the percentage-of-value tax) also varied from month to month, depending on the Index.

19 Former AS 43.55.010(e).

20/ The issue of what is the "wellhead" for royalty and Production Tax purposes has itself been hotly disputed. In Alaska when oil emerges from the ground at the "Christmas tree" atop the well casing, it is cleaned and dehydrated and separated from associated and dissolved gases before it is in a marketable condition. After it has gone through the surface equipment to make it marketable, it is then metered and either sold or

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prices, the percentage-of-value amount would be the greater. <sup>21/</sup> Thus, the cents-per-barrel rates, in effect, established a floor price for the value of the oil for Production Tax purposes, regardless of how low the actual "wellhead" price might fall.

To illustrate how the "stair step" tax worked, suppose a property had 10 wells and produced 450,000 barrels of 27-degree API gravity, valued at \$10 apiece during a 30-day month. The tax would be calculated as follows:

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transported away from the property through some common carrier pipeline. In a number of other states, the "wellhead" price is effective at the outlet of the tank gauge or custody transfer meter at which it is first measured in a marketable condition. In Cook Inlet and on the North Slope, it may be miles between the Christmas tree and the custody transfer meter, and the separators and dehydrators represent significant expenditures. If the incidence of the tax or the royalty is at the custody transfer meters, none of the costs incurred upstream from that point for the gathering lines, separators and dehydrators and associated equipment would be deducted in determining the price or value for purposes of paying the tax or royalty. Conversely, if the incidence of the tax or royalty is at the Christmas tree, then all those costs are deducted in determining the price or value on which the tax or royalty is computed and paid. The phrase "wellhead price," while commonly used, can therefore be misleading or at least ambiguous in the Alaskan context, since it is unclear whether it refers to the price at the custody transfer meter or a price further upstream, perhaps as far as the Christmas tree. The Production Tax is based on the "gross value at the point of production", which is specifically defined to be the point of measurement (as opposed to the Christmas tree); see AS 43.55.140(6), 15 AAC 55.210(6).

<sup>21/</sup> Five percent of \$3.375 equals \$0.16875, which is exactly what the cents-per-barrel rate was for the first "stair step." Six percent of \$3.375 is \$0.2025, the same as the rate for the second "step," while eight percent of it is \$0.27, the rate for the third. By 1977 the escalation in the cents-per-barrel rates due to the Wholesale price Index (see note 16, above) had raised the effective floor from its original \$3.375 to approximately \$6.10.

0 - 300 bbl/day "stair step": 10 wells, times 300 barrels per well a day, times 30 days, equals 90,000 barrels in this "stair step" of the 450,000 total taxable barrels produced. Five percent of 90,000 barrels at \$10 each equals \$45,000. 90,000 barrels times the cents-per-barrel rate of \$0.16875 22/ equals \$15,187.50.

301 - 1,000 bbl/day "stair step": 10 wells, times 700 barrels per well a day, times 30 days, equals 210,000 barrels in this "stair step", of the remaining 360,000 barrels that didn't fall into the first "step". Six percent of 210,000 at \$10 each equals \$126,000, while 210,000 times the \$0.2025 cents-per-barrel rate equals \$42,525.

1,000+ bbl/day "stair step": 450,000 total barrels, minus the 90,000 barrels falling in the first "stair step" and the 210,000 barrels falling in the second, leaves 150,000 barrels to fall in this top "step." Eight percent of 150,000 at \$10 a barrel is \$120,000, and at \$0.27 a barrel the cents-per-barrel amount is \$40,500.

The total percentage-of-value amount would be \$45,000 plus \$126,000 plus \$120,000, or \$291,000. This is greater than the cents-per-barrel amount of \$98,212.50 (\$15,187.50 + \$42,525 + \$40,500), so the actual tax would be paid on the percentage-of-value basis. The effective rate of tax in this example would be 6.47 percent (\$291,000 total tax, divided by a total value of \$4,500,000 for the 450,000 barrels, equals 0.0647).

After this tax system was enacted in October 1973 (ch. 4, FSSLA 1973), factors affecting the Alaska oil and gas market changed dramatically. The Arab oil embargo of the United States in early 1974 caused oil prices, which had doubled since the previous May, to redouble. Construction of TAPS finally began in 1974, but costs for constructing

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22/ For simplicity, the example uses the original rates set out in the statute. In actual practice, those rates would first have been adjusted for changes in the crude oil Wholesale Price Index (WPI). One might also note that, by having 27 degree API gravity oil in the example, the example does not show how to make the API gravity adjustment of two percent in the WPI-escalated cents-per-barrel rates per degree above or below 27 degrees would be made. For an example illustrating all these aspects of the former tax, see Alaska Department of Revenue, Alaska's Oil and Gas Tax Structure: A Study with Recommendations for Improvement (February 1977) (the "1977 Tax Study"), pp. II-6 to II-10.

that project continued to skyrocket over all earlier projections. The federal government imposed a complex system of price controls on crude oil and refined products, with a big question mark deliberately left in the system as to how Prudhoe Bay oil would fit into it all once that field came into production.

Uncertain as to what all these changes might mean in terms of the profitability of Prudhoe Bay and the appropriate level and type of state taxation, the Alaska Legislature in 1975 retained Tanzer Economic Associates, Inc. to conduct an economic analysis of Prudhoe Bay, its profits, and the effects of state taxation policy on those profits. In January 1976 Tanzer's results were released. <sup>23/</sup> The "Tanzer Report" concluded that Alaska could significantly increase the overall level of its tax burden on Prudhoe Bay and still provide a sufficient degree of profitability to reward the oil companies there for investing in the development of the field.

A flurry of legislative proposals to increase oil taxes immediately followed, ranging from "excess profit" taxes to a "separate accounting" income tax, with higher Production Tax rates as an option somewhere in between. In the face of misgivings by the Department of Revenue about some of the proposals and the lack of a clear legislative consensus about which proposal(s) to adopt, Governor Hammond prevailed upon the Legislature to give the Department a year to make a comprehensive study of Alaska's then current tax structure and make recommendations in early 1977 about any changes that should be made. <sup>24/</sup> Because of strong support in the Senate for a "separate accounting" income tax <sup>25/</sup> and be-

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<sup>23/</sup> Tanzer Economic Associates, Alaska's Prudhoe Bay Oil: Profitability and Taxation Potential (January 9, 1976).

<sup>24/</sup> The 1976 Legislature, through a Committee Substitute for Senate Concurrent Resolution 101 (CS SCR 101), resolved that the Legislative Council, through its Interim Committee on Oil and Gas Leasing and Taxation Policy, was to cooperate with the Administration in making a comprehensive and definitive study of Alaska's oil and gas leasing and taxation policies, with recommendations for improvement.

<sup>25/</sup> "Separate accounting" is one of two basic ways of determining how much of a multistate business's taxable income is attributable to its activities in a particular state for purposes of that state's income tax. It attempts to isolate the in-state activities from the rest of the business and see how much income results

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cause of criticism of the state income tax as early as 1973, 26/ the Department of Revenue and the Legislative Council engaged Professors Jerome M. Ziefman and Kenneth G. Ainsworth to make a special study of the income tax. 27/

The Department's report -- Alaska's Oil and Gas Tax Structure: A Study with Recommendations for Improvement (February 1977) (the "1977 Tax Study") 28/ -- was transmitted to the Governor on February 11, 1977. Besides incorporating the criticisms and recommendations of Professors Ziefman and Ainsworth about the income tax, the 1977 Tax Study examined the Production Tax, the state ad valorem tax on pipelines and production and exploration equipment and facilities, and the reserves tax. In its review of the Production Tax, the 1977 Tax Study noted:

. . . Typically production taxes do not reflect the expenses incurred to obtain the production. The tax is either some specified percentage of the gross value of the production or a flat fee of so

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from the in-state activities. The other way is "apportionment," in which a slice of the business's total income is attributed to its in-state activities on the basis of a prescribed formula. Of the consultants advising the Legislature in the mid-1970s, perhaps the most respected was Milton Lipton of Walter J. Levy & Associates. He and Dr. Michael Tanzer of Tanzer Economic Associates, Inc. were preeminent advocates of separate accounting as the way to reform the state income tax and even Alaska's oil and gas tax structure in general.

26/ Milton Lipton, "Testimony at the Joint Hearings of Proposed Oil and Gas Legislation before the House and Senate resources Committees" (March 23, 1973 transcript), p. 7.

27/ Ziefman and Ainsworth, The Taxation of the Petroleum Industry under Alaska's Corporate Income Tax (January 9, 1977).

28/ The principal draftsmen of the 1977 Tax Study were John R. Messenger, then Deputy Commissioner of Revenue (Taxation), and Thomas K. Williams, then Director of the Department's Petroleum Revenue Division. Important editorial review and suggestions were made by Dr. David L. T. Knudson, Petroleum Economist in the Petroleum Revenue Division. Revenue Commissioner Sterling Gallagher closely supervised the preparation of the report.

many cents per unit of production. Since it is not based on net proceeds of the production operation, the production tax simply represents another cost of doing business to the producer. 29/

. . . .

Once a discovery has been made and production begins, however, the production tax (and the landowner's royalty) can have a more significant impact on the economics of the production operation and the associated decisions. As operating costs rise during the life of the field, the profit margin shrinks. At some point the total production costs overtake the value of the oil or gas produced, and production can then be continued only by operating at a loss. As one of the costs of doing business, the production tax contributes to the total costs and tends to hasten the time when this break-even point (called the economic limit) is reached. 30/

Besides this negative economic effect of production and severance taxes in general, the 1977 Tax Study drew attention to a particular problem with the "stair step" tax as it applied to areas of Alaska where the operating costs differed greatly from each other:

The current State oil production tax contains a "stair step" feature which is intended to alleviate the adverse impact that a production tax can have on an oil well operating close to its true economic limit. . . . The "stair step" feature of the existing oil production tax schedule is an attempt to reduce the tax rate as production falls closer to the true economic limit. The tax rate declines from 8% to 6% to 5% as individual well output falls. Unfortunately, the current "stair steps" appear to be sized incorrectly.

Economic factors governing production operations vary widely in the State of Alaska. Some areas in the State are located close to the refinery market and have low operating costs. In these areas wellhead values are high. As a consequence, the true economic limit (measured in barrels per day) for these properties can be quite low: 50 to 75 barrels a day per well, or even lower, in some cases in Cook Inlet.

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29/ 1977 Tax Study, p. V-19.

30/ Id., p. V-21.

Other crude oil wells in Alaska are not located close to refinery markets and could have extremely high operating costs. The netback value in the field for these isolated areas is lower than in Cook Inlet and the operating and capital costs can be much higher than in Cook Inlet. Accordingly, the true economic limit (measured in barrels per day) for these producing properties can be quite high. Depending on the property, this limit might range from 300 to perhaps 1000 barrels per day [per well]. There is, then, a rather wide range of values which can be generated regarding the minimum production level at which Alaska crude oil wells can be operated.

From this perspective, an economic flaw in the existing or any other "stair step" production tax schedule becomes obvious. By establishing a fixed schedule of "stair stepped" tax rates, the State crude oil production tax is based on the faulty assumption that production economics are similar in Cook Inlet, Prudhoe Bay, and everywhere else in Alaska. 31/

To take care of these problems, the 1977 Tax Study made the following recommendation to replace the "stair steps" with the ELF: 32/

The Department of Revenue recommends perfecting the "stair step" approach as a means of eliminating effects of the production tax on the economics of oil production operations. The key to doing so is not found by creating a series of "steps" and rates that succeed in this for any one area of the State, such as Cook Inlet. As explained in Chapter V, a well producing 1000 bar-

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31/ Id., pp. V-28 to V-30.

32/ The original idea for an economic limit was by the then Director of the Petroleum Revenue Division of the Alaska Department of Revenue, Thomas K. Williams, in response to criticism, particularly by Milton Lipton, about the adverse economic effects of the Production Tax on properties as they near their economic limit. The precise formula for the ELF proposed in the 1977 Tax Study (and still the formula for the gas ELF) was developed jointly by Mr. Williams and Dr. David L. T. Knudson, Petroleum Economist in that division. The exponent for the oil ELF and the number 460 appearing in the exponent were features added during the legislative process as the result of work by Alan Latham, who was working for the Legislature.

rels a day may be quite a money maker in Cook Inlet but be mediocre or even marginal in other areas of the state such as the Interior or North Slope. Consequently the "stair steps" that succeed for the Inlet won't eliminate the economic effects of the tax elsewhere. Conversely, "stair steps" designed to eliminate those effects [for] production on the North Slope would give too much away to production in the Inlet.

To eliminate this difficulty, the Department of Revenue recommends an Economic Limit Factor (ELF), based on the ratio of the rate at the true economic limit to the current production rate, as a mechanism for scaling down the tax rate as the production declines toward the economic limit. This would be done by multiplying a basic tax rate times the difference between unity (the number, one) and the ratio of rate at limit to current rate.

. . . .

If the tax law conclusively sets the rate at the economic limit at some specific rate like 200 barrels a day per well, the ELF becomes simply one more economically rigid structure like the present "stair steps." It would not respond to the great regional differences in economic scale for production operations in Alaska. But the great advantage of the ELF over any specific set of "stair steps" is that it can be tied to the actual economic condition of a property anywhere in the state . . . . (emphasis in original) 33/

This was the first public proposal to adopt the ELF as a replacement for the "stair steps" in the Production Tax. Instead of a series of discrete "steps" in production rates at which tax rates changed, the ELF represented in effect a smooth curve, a series of an infinite number of "steps" each infinitesimally small. But beyond simply smoothing the "steps" into a continuous curve, the ELF had the additional advantage of allowing the whole curve itself to be shifted, to reflect the rate of production needed for that particular property to cover its basic operating costs at the economic limit. It could reflect the fact that in remote areas of Alaska like Prudhoe Bay, the rate of production needed merely to break even would be very much greater than the rates needed to break even in the more accessible areas like Cook Inlet and the Kenai Peninsula. Thus, the adverse economic

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33/ 1977 Tax Study, pp. VI-17 and VI-19.

effects on the economic life of an oil and gas property were no longer a necessary evil of a tax based on gross production value as the Production Tax is.

Governor Hammond acted on this recommendation by introducing Senate Bill 238 to the 1977 Session of the Legislature. 34/ After much legislative wrangling, an amended version of this bill (FCCS HCS CSSB 238) finally passed, and the ELF became part of the Production Tax. 35/

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34/ See 1977 Senate Journal, pp. 540-541 (Governor's transmittal letter).

35/ Ch. 136, SLA 1977.

## HOW THE ELF WORKS: VARIATIONS ON THE THEME

A. Introduction to the Exponent. The ELF formula for gas production (and formerly for "old oil" under now expired federal oil price controls) is simple and straightforward in its operation. It is merely one minus the ratio of production at the economic limit (PEL) to current production (TP), or to put it into mathematical symbols:

$$\text{ELF} = 1 - [\text{PEL}/\text{TP}]$$

As current production (TP) declines toward the "break even" rate (PEL), the ratio of PEL to TP gets larger and larger, eventually equaling one when TP has declined to the point that it equals PEL. At that point, the ELF becomes  $1 - 1$ , or zero. The tax is then also zero.

This same formula is at the root of the ELF for oil, except that there is, in addition, an exponent that is applied to it. (For a review of how exponents work and what fractional exponents mean, see Appendix A.)

The exponent in the oil ELF is a fraction whose numerator is 460 times the number of "well days" in the month when the oil was produced, and whose denominator is the monthly production rate at the economic limit. The number of well days is simply the sum for all wells of the number of days each of them was operated during the month. If 10 wells were each operated for 30 days during a month and two others were operated for 25 days each, then the number of well days is 350 (10 times 30, plus two times 25).

Depending on what PEL is, the exponent may be greater than, equal to, or less than one. If it is greater than one, the exponent is a "net power function" -- that is, the effect of raising to a power equal to the numerator of the exponent outweighs the effect of taking the a root equal to the denominator of the fraction. Conversely, if it is less than one, the exponent is a "net root function" and the effect of taking the root outweighs that of raising to the power.

As set out in the "simple" explanation of the ELF, the value of one minus the ratio of PEL to TP is always less than one and can range all the way down to zero. For numbers between zero and one, the effect of a "net power function" is to make the result smaller than the starting number. For example, 0.9 squared is 0.81; 0.01 to the fifth power is 0.000000001; 0.5 to the "1.000001"-th power is 0.499999653. Conversely, the effect of a "net root function" on this range of numbers is to produce a larger number: the square root of 0.81 (0.81 raised to the "one half"-th power) is 0.9; the fifth root (the "1/5"-th or

"0.2"-th power) of 0.0000000001 is 0.01; and 0.5 to the "0.999999"-th power is 0.500000347.

The value of PEL therefore has an important but subtle effect on the exponent. If PEL corresponds to more than 460 barrels a day per well, the exponent becomes a "net root function" and makes the value of the ELF larger than the starting number to which the exponent is applied. On the other hand, if PEL is less than 460 barrels times the number of well days, the exponent is a "net power function" and makes the final value of the ELF less than the number to which the exponent is applied.

B. The PEL Presumption: To Rebut or Not to Rebut?  
PEL appears twice in the oil ELF formula -- once in the exponent and once in the calculation of the number to which the exponent is applied:

$$\text{ELF} = (1 - [\text{PEL}/\text{TP}])^{([460 \times \text{WD}]/\text{PEL})}$$

For oil there is a rebuttable presumption that PEL equals 300 barrels times the number of well days in the particular month. 36/ The presumption may be rebutted only once a year, and if it is rebutted, the value that is demonstrated to be the proper PEL must be used for that entire calendar year. 37/ If the presumption is not rebutted, then the formula for the ELF is, in effect, the following:

$$\text{ELF} = (1 - ([300 \times \text{WD}]/\text{TP}))^{(460/300)}$$

The decision to rebut the presumption or not, presents some subtle trade-offs that must be carefully considered before proceeding. On the one hand, if the presumption is not rebutted, then the exponent is a "net power function," which produces a result that is smaller than the number to which the exponent is applied. On the other hand, if the presumption is rebutted and shown to be greater than 300 barrels per well day, then the ratio of PEL to current production will be made greater, leaving a smaller number to which the exponent is applied. If the demonstrated PEL is still less than 460 barrels per well day, the exponent will remain a "net power function" although, as the value for PEL approaches 460 barrels per well day, the effectiveness of the exponent in reducing the number to which it is applied will diminish. The effects of rebutting the PEL -- that is, the reduction in the difference between one and the ratio of PEL to current production (that difference being the number

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36/ AS 43.55.013(d).

37/ Id.

to which the exponent will be applied), and the "net power function" nature of the exponent -- will both be working in the same direction and reduce the ELF.

If PEL equals 460 barrels per well day, the exponent becomes exactly equal to one and has no effect at all on the number to which it is applied. The effect of rebutting the presumption is then simply the reduction in the difference between one and the ratio of PEL to current production, which will still yield a lower ELF than if the presumption were not rebutted.

Beyond 460 barrels per well day, the demonstrated PEL will turn the exponent into a "net root function," which will tend to offset the advantage to be gained by reducing the difference between one and the ratio of PEL to current production. Although that advantage always outweighs the offsetting effect of the exponent (in other words, it is always worth rebutting the presumption if possible, because doing so reduces the final value of the ELF), the extent to which this happens depends on how what the current average daily production per well is. The higher the production rate, the smaller the net effect is from rebutting the presumption.

The following table illustrates this for four cases: Case 1 has current average production of 500 barrels a day per well; in Case 2 it is 1,000 barrels a day per well; in Case 3, 5,000 barrels a day per well; and in Case 4, 10,000 barrels a day per well, corresponding roughly to the expectations in early 1977 for what would be the situation with the Prudhoe Bay field by the beginning of 1978. 38/

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38/ The throughput capacity of TAPS represents a physical constraint on the rate of production from North Slope fields. TAPS had been planned to start up in three phases: the first at a throughput of 600,000 barrels a day; the second and 1.2 million barrels a day; and the third at 1.5+ million. Until the third phase was implemented, TAPS's throughput capacity represented the upper limit at which the Prudhoe Bay field could be produced (Phase 3 would be at or above the maximum efficient rate for Prudhoe Bay of 1.5 million barrels a day). By early 1977 the first two phases had been "telescoped" together, so that TAPS was expected to be at 1.2 million barrels a day by the end of the year. That was, of course, before the fire and explosion at Pump Station 8 while the pipeline was being filled. However, for purposes of analyzing the ELF, the assumptions used by the Legislature and the Administration reflected the planned 1.2 million-barrel-a-day rate of production from the field into TAPS, with approximately 120 producing wells.

PEL	Case 1	Case 2	Case 3	Case 4
	(TP=500) ELF	(TP=1,000) ELF	(TP=5,000) ELF	(TP=10,000) ELF
300	0.245372	0.578740	0.909486	0.954370
400	0.157103	0.555743	0.908565	0.954140
450	0.095012	0.542741	0.908095	0.954023
460	0.080000	0.540000	0.908000	0.054000
470	0.063701	0.537208	0.907905	0.953977
500	-0-	0.528509	0.907618	0.953906
600	---	0.495351	0.906644	0.953670
700	---	0.453309	0.905641	0.953430
800	---	0.396362	0.904608	0.953187
900	---	0.308240	0.903544	0.952940
1000	---	-0-	0.902446	0.952690
2000	---	---	0.889149	0.949972

As the table shows, the effect of raising PEL by 100 barrels per well day from its presumed level of 300 is greatest in Case 1, dropping the ELF from 0.245372 to 0.157103. This reduction of 0.088269 in the ELF represents a tax reduction of 35.974 percent as the result of rebutting the presumption (0.088269 is 35.974 percent of the 0.245372 value of the ELF in Case 1 if the presumption is not rebutted). The reduction from similarly raising the PEL from its presumed rate steadily drops off as the rate of current daily production per well gets larger: the ELF is reduced by 0.022997 for the 1,000 barrel-a-day Case 2 (corresponding to a tax reduction of 3.974 percent); by 0.000921 for the 5,000 barrel-a-day Case 3 (tax reduction of 0.101 percent), and by a mere 0.000230 for Case 4 (tax reduction of 0.024 percent), the case approximating Prudhoe Bay as expected after the completion of TAPS start up. In fact, in the Prudhoe-type case, even showing a PEL of 1,000 barrels a day per well (which is about what PEL was then expected to be if the Prudhoe Bay producers had rebutted the presumption) would only reduce the ELF by 0.001680 from its value with the presumed PEL. Rebuttal of the presumption thus represented a potential tax reduction of only 0.176 of one percent.

The decision to rebut or not rebut the presumed PEL is thus seen to have a rule of diminishing returns, the larger the average of current daily production per well becomes. With a property with extremely productive wells, the potential advantage from rebutting the presumption may simply be too small to be worth the effort even though the property is in a high operating cost area of the state.

C. The ELF's Incentive to Continue Development Drilling in "Mature" Fields. Recent (1986) proposals to modify the ELF so that the presumed PEL is on a field-wide or

reservoir-wide basis instead of a per-well basis have overlooked the incentive that the present ELF offers for producers to continue development drilling in mature fields that are already producing at their maximum efficient rate (MER). This incentive is best illustrated by examining a particular example, rather than trying to describe it abstractly.

Suppose there is a field that is producing at its MER, which is 1,500,000 barrels a day, or 45,000,000 barrels in a 30-day month. Since this is the MER for the field, the 45,000,000 barrel figure will not change if another development well is drilled. Suppose further that there are already 500 producing wells in the field and that the presumption for PEL is unrebutted. What happens to the tax burden if the 501st development well is drilled?

Since the presumption for PEL is in effect, PEL can be replaced in the ELF formula by the expression  $[300 \times WD]$ . Thus the formula becomes:

$$ELF = \{1 - ([300 \times WD]/TP)^{([460 \times WD]/[300 \times WD])}\}$$

Given how WD is in both the numerator and denominator of the exponent, it cancels itself out and the exponent can be simplified to 460/300. With 500 wells all operating every day in a 30-day month, the number of well days is 15,000. Using the simplified exponent and filling in the variables with the appropriate numerical values from this example, the ELF becomes:

$$\begin{aligned} ELF &= \{1 - ([300 \times 15,000]/45,000,000)^{(460/300)}\} \\ &= \{1 - (4,500,000/45,000,000)^{(460/300)}\} \\ &= \{1 - (0.1)^{(460/300)}\} \\ &= 0.850822 \end{aligned}$$

Now if the 501st well is drilled, the number of well days will become 15,030, and the new ELF will be:

$$\begin{aligned} ELF &= \{1 - ([300 \times 15,030]/45,000,000)^{(460/300)}\} \\ &= \{1 - (4,509,000/45,000,000)^{(460/300)}\} \\ &= \{1 - 0.100200\} \end{aligned}$$

= 0.850532

While the difference in the ELF seems small -- a reduction of 0.000290 in the value of the ELF, or 0.034 percent -- its dollars-and-cents effect is not insignificant. If the field is still in its first ten years of production, the nominal tax rate is 15 percent. If it costs \$7.00 a barrel to get the oil to market, where it fetches \$15.00, the "wellhead" value is \$8.00. Assuming a one-eighth governmental royalty interest that is exempt from the Production Tax, the annual tax burden on this field with 500 wells would be:

$$\begin{aligned} \text{Tax} &= (1,500,000 \text{ B/D}) \times (365 \text{ days}) \times (1 - 1/8 \text{ tax ex-} \\ &\quad \text{empt share}) \times (\$8.00/\text{Bbl}) \times (15\%) \times (\text{ELF of} \\ &\quad 0.850822) \\ &= \$489,116,297 \end{aligned}$$

Now with 501 wells the tax becomes:

$$\begin{aligned} \text{Tax} &= (1,500,000 \text{ B/D}) \times (365 \text{ days}) \times (1 - 1/8 \text{ tax ex-} \\ &\quad \text{empt share}) \times (\$8.00/\text{Bbl}) \times (15\%) \times (\text{ELF of} \\ &\quad 0.850532) \\ &= \$488,949,583 \end{aligned}$$

In this example, drilling the 501st well results an annual savings of \$166,714 <sup>39/</sup> in the Production Tax. One must remember that the decision to drill each additional development well is a decision that must be made on its own merits. Past expenditures in developing the field may or may not have been good investments, but they are in any event irrelevant to the decision to spend additional money for further development. In contrast, a savings in the future Production Tax burden that will result from the drilling of an additional development well is definitely a factor to be weighed in the decision to drill that additional well or not, and it is one that helps tip the balance in favor of drilling it. Other favorable factors affecting the decision will be the ability to sustain production at the MER for a longer period of time if additional wells are drilled, and the likelihood that the amount of production ultimately

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<sup>39/</sup> It should be apparent from the calculation that the exact amount of tax savings to be realized from drilling an additional development well is also dependent on other factors as well, particularly the "wellhead" price. If in the example the market price had been \$25 instead of \$15, the tax savings would have been considerably greater -- \$375,106. Conversely, lower prices would have meant smaller tax savings.

recovered from the reservoir will be greater with more wells, both of which benefit the state as well as the taxpayer.

As this example shows, if the presumption regarding PEL has not been rebutted, all of the incentive provided under the present ELF is due to the fact that the presumed PEL is based on well days, which in turn depends on the number of development wells in operation. <sup>40/</sup> In other words, the only difference between the calculation of the ELF for 500 wells and the one for 501 wells is in the fact that there are 15,000 well days in the first and 15,030 in the second.

<sup>40/</sup> It is a slightly different story if the presumption has been rebutted and PEL is established as a fixed number number of barrels per month. There is still an incentive to drill the 501st well, but this time it is due to the fact that the well-days factor still appears in the numerator of the exponent even though it is no longer a factor in PEL (the denominator of the exponent). To illustrate how the ELF provides a drilling incentive when the presumption has been rebutted, let us start with the same figures as in the example in the main text and suppose PEL has been shown to be 9,000,000 barrels per month. With 500 wells the ELF is:

$$\begin{aligned} \text{ELF} &= \left(1 - \frac{9,000,000}{45,000,000}\right) \frac{(460 \times 15,000)}{9,000,000} \\ &= \left(1 - 0.200000\right) \frac{6,900,000}{9,000,000} \\ &= 0.842757 \end{aligned}$$

With 501 wells the ELF becomes:

$$\begin{aligned} \text{ELF} &= \left(1 - \frac{9,000,000}{45,000,000}\right) \frac{(460 \times 15,030)}{9,000,000} \\ &= \left(1 - 0.200000\right) \frac{6,913,800}{9,000,000} \\ &= 0.842469 \end{aligned}$$

In this example the difference in the ELF between having 500 producing wells and 501 is 0.000288. It is coincidental that this figure comes out so close to the difference in the ELF from drilling the 501st well in the example in the main text with the unrebutted presumption about PEL. The point being made here is that, if the presumption is rebutted, the present ELF still provides an incentive to drill another well.

## APPENDIX A

### A Review of How Exponents Work

Exponents can be sorted into two kinds: whole numbered exponents (1, 2, 3 etc.) and fractional exponents (1/2, 1/3, 2/3 etc.). The whole numbered exponents are the easiest to understand. Basically, a whole numbered exponent states how many times a particular number is to be multiplied by itself. For example,

$$4^3 = 4 \times 4 \times 4, \text{ and}$$

$$6^7 = 6 \times 6 \times 6 \times 6 \times 6 \times 6 \times 6.$$

Whole number exponents are often called "powers" -- in the two examples above, the first is four to the third power, the second is six to the seventh power.

Now suppose we want to multiply two numbers together, each of which is some power of the same number. What happens? Suppose we want to take four to the third power and multiply it by four to the second power. We already know that four to the third power is four times four times four, and four to the second power similarly is four times four. Thus,

$$\begin{aligned} 4^3 \times 4^2 &= (4 \times 4 \times 4) \times (4 \times 4) \\ &= 4 \times 4 \times 4 \times 4 \times 4 \\ &= 4^5 \end{aligned}$$

Notice that the exponent, 5, in the last line equals the sum of the two exponents, 3 and 2, of the numbers being multiplied together. One may draw from this example the following generalization: if a number, A, to the N-th power is multiplied by A to the M-th power, the product is A to the "N plus M"-th power, or

$$A^N \times A^M = A^{(N + M)}$$

(Remember, though, that it must always be the same base number that is being taken to the different powers and mul-

multiplied together, for this generalization to be true. A to the N-th power times B to the M-th power does not equal A times B taken to the "N plus M"-th power, nor does it equal just A to the "N plus M"-th power or B to the "N plus M"-th power. As a generalized statement, A to the N-th power times B to the M-th power equals A to the N-th power times B to the M-th power, and that's as simple as the statement can be made and still be a generalized statement. In limited kinds of cases it can be made into a simpler statement, but only when there are special values for A and B or special values for M and N, or both.)

Exponents have a similar property when division is involved instead of multiplication. Suppose we wish to divide five to fifth power by five to the third power (the third power of a number is called its "cube"; five to the third power is "five cubed"). The following shows what happens:

$$\begin{aligned} \frac{5^5}{5^3} &= \frac{5 \times 5 \times 5 \times 5 \times 5}{5 \times 5 \times 5} \\ &= \frac{\cancel{5} \times \cancel{5} \times \cancel{5} \times 5 \times 5}{\cancel{5} \times \cancel{5} \times \cancel{5}} \\ &= 5^2 \\ &= 25 \end{aligned}$$

Note that the exponent of the answer equals the difference between the exponent in the dividend (five to the fifth) and that in the divisor (five cubed). The generalization to be drawn from this example is that, when different powers of the same number are divided into each other, the exponent in the result equals the difference between those powers:

$$\frac{A^N}{A^M} = A^{(N - M)}$$

This generalized equation gives meaning to two special cases: the numbers one and zero when used as exponents. If N equals M plus one, then:

$$\frac{A^1}{A^0} = A^{(1 - 0)}$$

$$= \frac{A^N}{A^M}$$

$$= \frac{A^{(M+1)}}{A^M}$$

$$= \frac{A^M \times A}{A^M}$$

$$= A$$

Thus, any number to the first power equals that number. (The preceding demonstration does not apply when A equals zero, because it would involve dividing by zero; however, the generalization still applies in the case of zero, so that zero to the first power is zero.)

Now, to get the zero-th power, N and M must be equal, and then the following happens:

$$A^0 = A^{(N-M)}$$

$$= \frac{A^N}{A^M}$$

$$= \frac{A^N}{A^N}$$

$$= 1$$

Therefore, any number (except zero itself) raised to the zero-th power equals one.

Now, what happens if a number being raised to some power is itself the power of another number? For example, four is two to the second power (the second power of a number is its "square"; two to the second power is "two squared"). What is four cubed if it is converted into powers of two?

$$\begin{aligned}
 4^3 &= 4 \times 4 \times 4 \\
 &= (2^2) \times (2^2) \times (2^2) \\
 &= (2 \times 2) \times (2 \times 2) \times (2 \times 2) \\
 &= 2 \times 2 \times 2 \times 2 \times 2 \times 2 \\
 &= 2^6
 \end{aligned}$$

In other words,

$$\left[ \begin{array}{c} 2 \\ 2 \end{array} \right]^3 = 2^6$$

Notice that the exponent 6 in the answer equals 2 times 3. Once again this example gives rise to a generalization: if the quantity, A to the N-th power, is itself raised to the M-th power, the result equals A to the "N times M"-th power:

$$\left[ \begin{array}{c} N \\ A \end{array} \right]^M = A^{(N \times M)}$$

When a number is raised to the N-th power, we are asking what the product is of multiplying one by that number N times. The N-th root of a number works the other direction. For a given number, it asks what number, when raised to the N-th power, will yield that given number. Thus, two is the cube root of eight, because two cubed (i.e., two times two times two) equals eight.

To show the N-th root of a number (call it A), the exponent is the fraction 1/N. The reason for having 1/N as the exponent to show the N-th root of a number is as follows: Let R stand for the N-th root of A. then by definition R to the N-th power equals A, or in mathematical terms:

$$R^N = A$$

Now let X stand for the exponent applied to A that is to be used to signify the N-th root of A; In other words, A to the X-th power equals the N-th root of A, which is R. In mathematical terms again, this is:

$$A^X = R$$

Substituting A to the X-th power in the second equation above gives the following:

$$R^N = \left[ A^X \right]^N = A$$

Just a little bit above we showed that if the N-th power of a number is itself taken to the M-th power, the result equals that base number taken to the "N times M"-th power. Hence,

$$\left[ A^X \right]^N = A^{(X \times N)} = A^1 = A$$

Since A to the "X times N"-th power equals A to the first power, then the exponents, although expressed differently, must be equal. So, X times N equals one. Therefore, X equals one divided by N, or 1/N. Since R, the N-th root of A, equals A to the X-th power, and since X equals 1/N, then R equals A to the "1/N"-th power. Q.E.D.

It is now but a simple step to understand what fractional exponents do. If the exponent is a fraction, M/N, it simply means that the N-th root of the base number is found and then that root is raised to the M-th power, or alternatively, that the base number is first raised to the M-th power and then the N-th root is taken. In mathematical terms:

$$\begin{aligned} A^{(M/N)} &= A^{[(1/N) \times M]} \\ &= \left[ A^{(1/N)} \right]^M \end{aligned}$$

or

$$\begin{aligned} A^{(M/N)} &= A^{[M \times (1/N)]} \\ &= \left[ A^M \right]^{(1/N)} \end{aligned}$$

It does not matter which is done first, taking the N-th root or raising to the M-th power, as a brief example will show. Suppose we want to take eight to the two-thirds power. The cube root of eight is two, which when squared equals four. Now, reversing the order between taking the root and raising

to the power, the square of eight is 64; the cube root of 64 is four. Both ways, the answer is four.

Fractional exponents expressed in decimal terms are no different from any other fractional exponent. Thus,

$$\frac{0.125}{A}$$

is simply the 125th power of the 1,000th root (or equivalently, the 1,000th root of the 125th power) of A. If, as here, the fraction can be simplified (0.125 equals 1/8), there is no change in the result if the simpler fraction is substituted (nor would there be if a less simple form of the same fraction were substituted for a simple one). The 125th power of the 1,000th root of A is exactly equal to the eighth root of A:

$$\frac{0.125}{A} = \frac{(1/8)}{A}$$

**ELF BRIEFING BOOK**

**BP EXPLORATION (ALASKA) INC.**

**MARCH 17, 1989**

## EXECUTIVE SUMMARY

- Proposed changes to the ELF incentive are not designed to promote development of marginal fields. Their sole purpose is to increase taxes on Prudhoe Bay and Kuparuk so the governor can sustain state spending at 4-1/2 times the national average. At no time has the governor mentioned reducing state spending, even though the public overwhelmingly has supported substantial budget cuts during recent budget workshops held throughout Alaska. According to an internal memo from Gregg Erickson, his own chief economist, state government grew by more than 1,300 employees between November 1987 and November 1988. State government salaries and benefits also increased during the same period, while private-sector wages and benefits declined.
- While oil accounts for a third of Alaska's gross state product, it provides 85% of state government revenues. Alaska's severance tax on Prudhoe Bay oil is more than 12% -- nearly the highest in the U.S. With proposed changes to ELF, the rate would be nearly 15% -- by far the highest in the nation. According to the state's October revenue projections, the state currently receives 50% of the net profits from North Slope production.
- For every \$1 BP Exploration has earned from North Slope production over the last three years, it has paid the state \$1.40. During that period, the state has collected more than \$2 million a day in taxes and royalties from BP Exploration; B.P. Exploration's after-tax profit has been less than \$1.5 million a day. Since production began at Prudhoe Bay, the industry has paid the state nearly \$30 billion in taxes and royalties.
- Over the last three years, BP Exploration has reinvested 80% of its production profits in North Slope exploration and development. It plans to invest between \$2 billion and \$2.5 billion over the next five years, which should facilitate the recovery of an additional 750 million barrels of oil for the state to collect royalties on and tax. This investment is creating jobs for Alaskans and revenues for state government. Hurl State is an example of a marginal development inside the Prudhoe Bay field. Facilities are being designed, fabricated, transported and installed in Alaska, by Alaskans. The \$80 million project is generating some 300 construction jobs and will increase recovery from Prudhoe Bay by 37 million barrels. ELF is working as intended: it encourages marginal projects like Hurl State at Prudhoe Bay and Kuparuk.
- The 20-cent-per-barrel impact of ELF referred to by the governor (BP calculates the impact to be 25 cents) represents more than 10% of the oil industry's after-tax profits from North Slope production (which averaged \$1.48 per barrel, according to state figures).
- Recently Gregg Erickson has based the state's and industry's shares of revenues from oil production on \$18-per-barrel oil; \$18 oil would increase state revenues \$700 million a year over current projections -- enough to cover even the governor's \$2.3 billion budget.

## "ELF" OVERVIEW

### PRESENT ELF

- More profitable fields should pay a higher rate of tax than less profitable ones.
- ELF is based on the percentage of a field's production not needed to cover direct operating costs -- this non-cost percentage represent potential profit.
- The higher the "profit percentage," the higher the tax is under the present ELF. This reflects the higher profitability of a field having a high "profit percentage."
- Marginal fields have a very low "profit percentage." By being based on this percentage, the ELF lowers the tax rate for marginal fields. When all of the production is needed to cover direct operating costs, the "profit percentage" is zero and the ELF equals zero, so there is no tax. This in fact happened for Milne Point, which had zero production tax during the last part of the time it was in production.

### PRPROSED ELF (HB 118 AND SB 97)

- Field size, not profitability, would become the dominant factor in the ELF.
- With field size as the dominant factor, the ELF would create an incentive to keep small fields small. For example, adding 1,000 B/D to a 100,000 B/D field would increase the tax rate not only on the additional 1,000 B/D, but on the the 100,000 B/D as well.
- Relying on field size would create an incentive to make large fields smaller. For example, cutting 1,000 B/D from a field producing 1,500,000 B/D would give a tax break to all of the remaining 1,499,000 B/D.
- Two fields could have exactly the same profit, but the larger one would pay more tax.

	Field A	Field B
Number of Wells	500	5,000
Total Production (B/D)	151,000	1,501,000
Production Needed to Cover Costs (300 B/D per well)	150,000	1,500,000
PROFIT (B/D)	1,000	1,000
PROFIT PER DAY (@ \$7.36/B)	\$7,360	\$7,360
SB 97 - TAX PER DAY	\$ 330	\$ 593,461
HB 118 - TAX PER DAY	\$1,016	\$1,170,652

## ELF AND PROFITABILITY

The ELF is designed so that more profitable fields pay a higher tax rate than less profitable fields. The way the ELF does this is by looking at what percentage of a field's production is needed to cover the basic operating costs to get that production out of the ground. This "cost percentage" is then subtracted from 100% to find the percentage of production that represents potential profit. The ELF is based directly on this "profit percentage." A high "profit percentage" reflects a high degree of profitability. So, the higher the "profit percentage" is, the higher the tax rate is.

## ELF AND FIELD SIZE

The present ELF does not ask how large a field is -- all the ELF needs to know is what percentage of a field's production represents potential profit. This is because the ELF reflects the principle that more profitable fields should pay higher taxes, and less profitable fields should have lower rates.

Field size is not a reliable indicator of whether a field is profitable or not. For example, the McArthur River field in Cook Inlet has paid back more for each dollar invested in it than Prudhoe Bay has, even though McArthur River is only 1/20 the size of Prudhoe. At the other extreme, the West Sak field is very large. But it is at least as marginal as Milne Point, which is only a fraction of West Sak's size.

The ELF avoids messy questions of whether a large field is as profitable as a small one. Instead, it goes straight to the heart of the question. How much of the production from a field, large or small, is needed to cover its operating costs, and how much represents potential profit? The higher the "profit percentage," the higher the ELF is and the higher the tax rate becomes for that field.

## HOW ELF WORKS

The ELF is just a number between zero and one that is multiplied times a base tax rate. This number is found by looking first at what percentage of a field's production is needed to cover the basic operating costs to get that production out of the ground. This "cost percentage" is subtracted from 100% to find the percentage of the production that represents potential profit.

For gas, this "profit percentage" is the ELF. In other words, if 75% of a field's gas production represents potential profit and only 25% is covering basic operating costs, then the ELF for that field is 0.75. For oil, the profit percentage is raised to an exponent, and the result equals the ELF.

In the case of this hypothetical gas field with an ELF of 0.75, the tax rate would equal 0.75 times the base rate of 10%, or 7.5 percent.

If an oil field has an ELF of 0.75, the actual tax rate will be 0.75 times the base tax rate for oil, which is 12.25% during the first five years of production and is 15% thereafter. So, if the field is still in its first five years, its actual tax rate will be 0.75 times 12.25%, or 9.1875 percent. If the five years had already passed, the rate would be 0.75 times 15%, or 11.25 percent.

### ELF AND MARGINAL FIELDS

A marginal field is simply one where most or all of its production is needed to cover the operating costs of getting that production out of the ground. All fields -- no matter how profitable they may be at the beginning -- become marginal eventually.

The ELF automatically takes care of fields as they become marginal, because it starts with the percentage of production that is needed to cover the operating costs. If this "cost percentage" is high (as it would be when the field is getting marginal), the remaining percentage of the production representing potential profit is small. The ELF is based directly on this "profit percentage," so a small "profit percentage" means the ELF is small. A small ELF means a low tax rate.

As more and more of the production is needed to cover operating costs, the ELF gets smaller and smaller and the tax rate gets lower and lower. When all of the production is needed to cover operating costs, the "profit percentage" is zero and there is no tax at all.

### ELF AND PRUDHOE BAY

Because of tax legislation in 1981, a rule was added to the ELF statute which says that if the ELF is more than 0.7 for a field, the ELF is to be "rounded" up to one (1.0). In other words, this rule assumes that 100% of such a field's production represents potential profit and none of it is needed to cover operating costs. Such an assumption is not realistic, of course, because a field never has operating costs of zero.

Since a field always has some operating costs in the real world, this "rounding" rule is only applied during the first ten years of a field's production. After that, the ELF goes back to being based on the actual percentage of production that represents potential profit over and above the basic operating costs. Prudhoe Bay had its tenth anniversary in June 1987, and so the ELF went back to being based on Prudhoe Bay's actual percentage instead of the artificial assumption that 100% of its production represents profit.

## ELF AND MILNE POINT

The ELF worked at Milne Point. Conoco was able to show the Department of Revenue that the costs of operating Milne Point were greater than the value of all of its production. As a result the "profit percentage" in the ELF formula was zero for Milne Point, and there was no production tax at all during the last half of the time it was in production.

The ELF can only reduce the production tax for a field; it cannot subsidize that field. Reducing the tax to zero was as much as the ELF could do to help Milne Point. What shut that field down was a combination of low oil prices and the unusually high royalty rate which that field suffers from.

## ELF AND THE STATE'S FAIR SHARE

When Alaska's oil and gas tax laws were last overhauled in 1981, there was a consensus of the legislative leadership and the administration that the State's "fair share" of the oil wealth should not be less than 30 percent. This corresponded with a rough one-third, one-third, one-third division of that wealth among the three parties interested in it -- the oil companies, the State of Alaska and the IRS. Thirty percent was as far below Alaska's one-third share as the political leaders were willing to accept.

From 1981 through June 1987, the State's share was always more than 30 percent. This is based on studies by the Department of Revenue.

Since June 1987, when the ELF "rounding" rule expired for Prudhoe Bay, the State's share has still been above 30 percent. Based on the present official price forecast of \$7.36 for FY 89, the State is currently receiving almost half (49%) of the well-head value of the oil after lifting costs and depreciation are taken out. The industry's share is 34 percent. Even with the Cowper Administration's numbers (which are based on a value in Valdez), Alaska's share is 36 percent.

## ELF AND THE BILLION DOLLARS "LOST" SINCE 1981

In 1981 Alaska repealed its separate-accounting income tax, which was under constitutional attack in court, and replaced it with the present income tax, which uses a modified apportionment formula to determine taxable income earned in Alaska. To offset most of the loss in income tax revenue from this change, the oil production tax was increased.

On June 22, 1981 Mr. Donaldson of SOHIO testified to the Free Conference Committee about the bill that was enacted two days later. He said it represented a "94:6 division of the dollars at risk" under separate accounting (transcript, p.44, line 1; see also p.43, lines 8-18). The fiscal note prepared in 1981 by the Commissioner of Revenue indicated that, in FY 82 - FY 85, the State would receive over 98% of the revenues it would have received if it kept separate accounting.

According to testimony this year by the Department of Revenue to the House Resources Committee, the State has collected a total of \$9.208 billion in income tax and production tax from the oil industry in FY 82 - FY 87, versus \$9.878 billion<sup>1</sup> that it would have collected under separate accounting during that time. In other words, the State has gotten 93.2% of the income tax and production tax revenue that it would have received if it had gambled and stayed with separate accounting. This is very close to Mr. Donaldson's figure of 94%, although it is five percentage points short of the Commissioner's estimate of 99 percent.

To keep these variances in perspective, it is worth remembering that the "lost" billion (or \$670 million, to be more accurate) is a cumulative figure over a six-year period. Petroleum revenue forecasting simply cannot have a high degree of accuracy over such a long period of time, except through good luck. Even the current official revenue forecast has a range of more than \$2.1 billion between the "low" and "high" cases for FY 89 - FY 91, which is only a three-year period.

#### ELF AND GOVERNOR COWPER

The ELF goes back a long way. It was enacted in 1977 and took effect within two weeks of the start-up of Prudhoe Bay. Except for those two weeks, there has always been an ELF for Prudhoe Bay.

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<sup>1</sup> While the Department of Revenue claims the "loss" is \$1,002 million, it acknowledges that the "loss" would have been \$670 million in FY 82 - FY 87 if the federal Windfall Profit Tax had been allowed as a deduction under separate accounting. In 1981 the Department of Law was strongly recommending the allowance of a Windfall Profit Tax deduction in determining taxable net income from Alaska production, or else the likelihood of losing the lawsuit over separate accounting would have been materially increased. The figure of \$9.878 billion in the text equals the \$9.208 billion that was actually collected, plus the \$0.670 billion that would have been collected under separate accounting with a Windfall Profit Tax deduction.

Back in 1977 Governor Cowper was Chairman of the House Finance Committee. His committee held intensive hearings on the ELF formula. After considerable examination of alternative formulas (including polynomials), he recommended the addition of an exponent to the formula, so that it was basically the same ELF formula as the one on the books today. The only difference is, his formula had 300 in the exponent instead of 460. This is what he said back then about the ELF:

Given the tax relief that the administration's severance tax proposal will afford the economically marginal oil and gas fields and the relatively modest increase in taxation the proposal places on the highly productive and profitable oil and gas fields, House Finance Committee Substitute for CS for SB 238 represents a balanced and reasonable adjustment to the present tax law.

The ELF formula has not been changed since its enactment in 1977.

## PROFITABILITY. REINVESTMENT SINCE PRICE DECLINE

### BP EXPLORATION (ALASKA), INC.:

- Currently owns 47% of North Slope oil production (41% net of State's royalty oil).
- Over the last 3 years, BP Exploration has reinvested over 80% of its profits back into North Slope production and exploration.
- Over the last 3 years, BP has paid the State an average of \$214 million more per year in taxes and royalties than it has earned. For every \$1.00 BP has earned it has first paid the State \$1.40.
- Over the next 5 years, BP Exploration expects to invest \$2.0 billion to \$2.5 billion and allow the production of an additional 750 million barrels - almost all at Prudhoe Bay and Kuparuk.

	\$ MILLIONS			
	<u>'86</u>	<u>'87</u>	<u>'88</u>	<u>AVG</u>
After Tax Income	\$140	\$909	\$560	\$536
Payments to State	\$604	\$897	\$751	\$750
Capital and Exploration Costs	\$698	\$278	\$341	\$438

- BP's pipeline interest has additional profits which are dictated by a settlement agreement signed by the State of Alaska and the pipeline owners. BP's pipeline interest also pays additional Alaska taxes.

\$ MILLIONS

	<u>Production Tax</u>	<u>Royalty<sup>1</sup></u>	<u>Income Tax</u>	<u>Property<sup>2</sup> Tax</u>	<u>Totals</u>
1986	272	216	22	94	604
1987	394	365	58	80	897
1988	<u>297</u>	<u>300</u>	<u>59</u>	<u>95</u>	<u>751</u>
TOTALS	963	881	139	269	2,252
				AVERAGE	750

- (1) A portion of the royalty payment goes directly to the Permanent Fund.
- (2) A portion of the property tax goes to municipalities or boroughs.

# Supplementary Information on Oil and Gas Exploration, Development and Production Activities

This section provides information specified by Statement of Financial Accounting Standards No. 69 (FASB 69), "Disclosures about Oil and Gas Producing Activities."

Three general disclosure areas comprise the information in this section. The first area provides historical information about costs and revenues, including the Company's aggregate recorded investment in oil and gas properties, annual costs incurred and a separate statement of the results of operations for producing activities. The second area

contains the Company's petroleum engineers' quantity estimates for proved oil and gas reserves and the major factors causing changes in these reserve estimates. The final area of disclosure assigns a monetary value to proved reserve quantities and changes therein using a standardized formula as specified in FASB 69.

The Company has provided additional commentary throughout this section that is important for a proper understanding of the nature of the data provided and its inherent limitations.

## Historical Information

Millions of Dollars	1987			1986		
	Total	Alaska	Lower** 48 States	Total	Alaska	Lower** 48 States
<b>Capitalized Costs of December 31</b>						
Proved properties	\$13,374	\$10,879	\$ 2,495	\$11,000	\$ 8,471	\$ 2,529
Unproved properties	802	112	690	837	95	742
	14,176	10,991	3,185	11,837	8,566	3,271
Accumulated depreciation, depletion and amortization	4,770	3,506	1,264	4,074	2,798	1,276
	\$ 9,406	\$ 7,485	\$ 1,921	\$ 7,763	\$ 5,768	\$ 1,995
<b>Costs Incurred (capitalized or expensed)</b>						
Acquisition of properties*	\$ 27	\$ —	\$ 27	\$ 33	\$ 2	\$ 31
Exploration	239	47	192	321	35	286
Development	665	317	348	1,128	810	318

\*Excludes \$1,953 million of purchase price premium allocation, arising from the 1987 acquisition of the minority interest in Standard Oil.

\*\*Foreign costs are included in Lower 48 States.

231 Capital

668 Capital

## Results of Operations for Producing Activities

The following summarizes the "Results of Operations for Producing Activities," as defined by FASB 69, for the years ended December 31, 1987 and 1986. As specified, financing costs are not included in this summary.

Income taxes are included in the results and were computed under FASB guidelines using statutory tax rates, while considering the effects of permanent differences and tax credits relating to oil and gas producing activities.

Millions of Dollars	1987			1986		
	Total	Alaska	Lower* 48 States	Total	Alaska	Lower* 48 States
Revenues from the sale of oil and gas						
To third parties	\$3,450	\$3,206	\$ 244	\$2,070	\$1,894	\$ 176
To affiliates	178	134	44	116	79	37
	3,628	3,340	288	2,186	1,973	213
Production costs	1,220	1,051	169	942	815	127
Depreciation and depletion	1,009	860	149	814	648	166
Exploration expenses						
Geological and geophysical	32	1	31	31	1	30
Amortization of unproved properties	91	9	82	601	113	488
Dry hole costs	81	3	78	223	55	168
Other	119	58	61	160	21	139
Total exploration expenses	323	71	252	1,015	190	825
Unusual items	—	—	—	283	72	211
Income (loss) before interest, income taxes, minority interest and extraordinary item	1,076	1,358	(282)	(868)	248	(1,116)
Income taxes	493	611	(118)	(413)	108	(521)
	\$ 583	\$ 747	\$ (164)	\$ (455)	\$ 140	\$ (595)

\*Foreign operations are included in Lower 48 States.

STANDARD OIL PRODUCTION COMPANY

Supporting Schedule C (1)  
 RESULTS OF OPERATIONS FOR PRODUCING ACTIVITIES - 1988  
 (\$ Millions)

	TOTAL	ALASKA	LOWER 48	FOREIGN
Revenues from the sale of oil and gas:				
Sales to third parties		350.0		
Sales to affiliates		4,190.3		
Transportation costs		(1,836.3)		
Royalty expense		(100.7)		
Total netback revenue	0.0	2,523.3	0.0	0.0
Production costs		998.1		
Depreciation & Depletion		877.1		
Exploration expenses:				
Geological and geophysical		3.5		
Amortization of unproved properties		4.8		
Dry hole costs		0.3		
Other - cash		4.1		
Other Non-cash		1.7		
Total exploration expenses (a)	0.0	14.4	0.0	0.0
Unusual Items				
Income before interest, income taxes and extraordinary items (b)	0.0	633.7	0.0	0.0
Income taxes on U.S. basis (U.K. Basis = 250.9)		290.4		
	0.0	343.3	0.0	0.0

(a) Amounts should tie to totals on Schedule C (3).

(b) Must equal U.S. GAAP Operating Income for SOPC, Excluding Alaska Pipelines and Gas Marketing Activities, as reported to BP America Control Reporting during the year end 1988 financial close.

\$ MILLIONS

	<u>1986</u>	<u>1987</u>	<u>1988</u>
Income Before Income Tax	\$ 248	\$1,358	\$ 634
Add: Depreciation from BP purchase	<u>0</u>	<u>162</u>	<u>216</u>
Adjusted Income Before Income Tax	248	1,520	850
Income Tax	<u>(108)</u>	<u>(611)</u>	<u>(290)</u>
INCOME	<u>\$ 140</u>	<u>\$ 909</u>	<u>\$ 560</u>

## OIL TAXES: WHAT HAPPENED IN 1981

### Background

The 1981 oil tax legislation responded to a legal challenge to the constitutionality of Alaska's separate accounting income tax, which had been enacted in 1978. By 1981, about \$2 billion had been collected under separate accounting, and future revenue under that tax was projected to be about a billion dollars a year. The litigation was expected to go to the U.S. Supreme Court, with the final outcome in 1985 or '86. By then, if the State lost, the potential tax refund could have been \$6 billion or more, with several billion more in interest. Even with the much higher oil price forecasts of that time, such a huge refund would have been more than the State's entire projected annual revenue.

Two U.S. Supreme Court decisions in 1980 (Mobil Oil v. Vermont and Exxon v. Wisconsin) had increased the legal doubts about the validity of separate accounting. In both cases, a large multinational oil company had sought to have separate accounting applied, and in both cases the Supreme Court said no. In rejecting the oil companies' arguments, the Court made some gratuitously critical comments about separate accounting, noting in one case that it was "theoretically incommensurate" with apportionment, the tax method that the Court was upholding.

### The State's Fair Share

In March 1981 the leadership of the House and Senate made a joint statement with the Governor, declaring that Alaska's fair share should not be less than 30% of the value represented by the oil. This consensus figure reflected the perception that there were three parties with interests in that money -- the oil companies, the State of Alaska, and the IRS. Roughly split three ways, a fair share would be one third, or 33 percent, to each party. The 30% figure was as far below the one-third share as the State's political leaders were willing to go.

### The Options in 1981

The Legislature considered three basic options in 1981 -- a "back stop" reserves tax, a "settlement" package of legislation that would end the lawsuit over separate accounting, and legislation to stop the State's financial exposure from continuing to grow year by year while the lawsuit was pending. A fourth potential option -- to do nothing -- was generally seen as unacceptable gamble with the public's money.

The "back stop" reserves tax proposal was developed jointly by the Administration and the House, particularly the House Oil and Gas Committee. Under this proposal, a new property tax on oil and gas reserves would be enacted, and this new tax would be as large or larger than the separate accounting revenue. Each taxpayer's liability under separate accounting would give rise to a dollar-for-dollar credit against the reserves tax. If a refund was made for separate accounting, the credit against the reserves tax would shrink accordingly. Thus the reserves tax liability would increase to offset a refund for separate accounting.

The "settlement" idea was developed by Senator Dankworth in the course of discussions with industry, particularly Exxon. Under this approach, the State would repeal separate accounting after 1981 and replace it with apportionment, using a specially modified apportionment formula. There would also be an investment tax credit, not limited to the oil industry, for new investments in Alaska. In its final version, the "settlement" bill would have given the State about 70% of the revenue it would get if it kept separate accounting.

The "limit the exposure" idea arose during the Free Conference Committee's hearings on SB 524 after it became clear that Senator Dankworth's "settlement" bill would give up too much revenue to be politically acceptable. This bill, which is what passed, also repealed separate accounting after 1981 and replaced it with the same modified apportionment formula. To offset most of the reduction in income tax revenue, the severance tax was increased from 12.25% to 15% and a "rounding" rule was adopted for the ELF. Under this rule, if the ELF under the statutory formula was more than 0.7 during the first 10 years of a field's production, it was "rounded" to one (1.0). The Free Conference Committee received testimony that this option would give the State about 95% of the revenue it would get if it kept separate accounting.

The bills for all three options contained certain retroactive amendments to the separate accounting statutes, to remove potentially prejudicial side issues from the litigation. The most notable was the allowance of a deduction for the Windfall Profit Tax, the federal tax on oil that rose in price as the result of its release from price controls. Legal opinion then was that such a deduction was necessary or else the State's chances of winning on separate accounting would be significantly reduced.

### What Happened

The Free Conference Committee on SB 524 first met on June 11, 1981. The next day the "coup" in the House took place, and the House reorganized itself from June 12th through the 16th. When the Committee reconvened on June 22nd, its membership from the House had been changed. After hearings on the 22nd and 23rd, it adopted its committee substitute on June 24th. Both houses passed it the same day.

### The Results

According to a 1985 study by the Department of Revenue, the State received more than 30% of the oil value each year from FY 82 through FY 85. Public (non-oil company) information shows the percentages were over 30% for FY 86 - FY 88. As for the "lost" billion dollars (really \$0.67 billion with the Windfall Profit Tax deduction under separate accounting) in the FY 82 - FY 87 period, the Administration's own numbers today show that Alaska has received over 93% in production tax and income tax revenues as it would have if separate accounting had been kept (\$9.208 billion vs. \$9.878 billion).

## ADMINISTRATION ARGUMENTS

### ADMINISTRATION

- The industry is not paying its fair share.
- The industry is not reinvesting its profits.
- Pipeline profits are too high and therefore the production tax should be increased (by changing the ELF).
- The industry is drilling extra wells and running wells at short intervals to take advantage of ELF.
- Industry testified against the ELF in 1977.
- State is not getting as much as Indonesia with less production.
- Milne Point closed because of a high production tax.

### BP EXPLORATION

Over the last 3 years, every \$1.00 that BP Exploration has earned from North Slope production, it has first paid \$1.40 to Alaska. The industry accounts for 85% to 90% of the state's revenues.

Over the last three years, BP Exploration has reinvested 80% of its production profits in Alaska.

Pipeline profits are regulated by the FERC settlement agreement signed by the State of Alaska and the industry. The rate of return is currently 6.4%.

Each well drilled is approved by the Alaska Oil and Gas Conservation Commission.

There is no advantage to running wells for short periods - regulations are based on per hour operation. Hundreds of wells were drilled with constant 15% rate.

Industry testified against a rate increase from 8% to 12.25%. The quotes are out of context.

Per ARCO, the wellhead price was \$17.50 in Indonesia vs. \$6.93 in Alaska in 1987. This price difference accounts for the difference, not industry profitability.

When Milne Point shut-in, its production tax was 0%. Its effective royalty was over 18%.

ADMINISTRATION ARGUMENTS (continued)

ADMINISTRATION

- Using \$18 ANS, the state share is only 29%.
- The current rate is too low.
- The state has lost \$1 billion from the 1981 legislation.
- The oil industry is enjoying great profits and should pay more tax.

BP EXPLORATION

This figure includes pipeline income. It also increases state revenue by \$700 MM vs the fall revenue forecast. The \$139 million from ELF should not be needed.

The current rate at Prudhoe is within 1% of being the highest in the nation by far.

The actual number is \$670 million (assuming a deduction for windfall profits tax). This is 93.2% of neutrality. Sohio had testified it would be 94%.

No other state is proposing major oil tax increases. The federal government is considering tax incentives for what it considers an ailing oil production industry.

**STATE:** The current tax rates at Prudhoe Bay and Kuparuk are too low. Neither is on decline - why should the rate be reduced.

**INDUSTRY:** Formerly, Prudhoe Bay was capable of producing well above its maximum economic rate of 1.5 million barrels per day. Currently, the capability to produce above that rate has dropped significantly.

The tax rate should tie to profitability not productivity. PBU has produced for 12 years in the harshest climate in the world. Maintenance costs are skyrocketing, prices are down. Avoiding decline was automatic in 1981 - it is extremely expensive in 1989. The field would decline at 20 percent per year if investment stopped. Do not give the industry incentives to hasten and to steepen decline.

**STATE:** The current tax rates at Prudhoe Bay and Kuparuk are too low. They are immensely profitable and can afford to pay more. The industry is taking \$12mm per day out of the State (net of reinvestment).

**INDUSTRY:** Over the last 3 years, BP Exploration has reinvested over 80 percent of its North Slope production profits. Our capital budgets over the next 5 years are estimated to total between \$2.0 and \$2.5 billion and are expected to allow the production of an additional 750 million barrels.

The State is apparently saying that we are taking out \$12 million per day. Our own figures, shown below, put the number at under \$1 million per day.

The closest we can get to the basis of the \$12 million per day is from G. Erickson's presentation in House Resources where he determined the cash flow to be \$5.46 per barrel which would total about \$11 million per day. This \$11 million more or less will reconcile to our figures noting the following differences:

- o About \$6 million per day is depreciation. Depreciation is simply recovery of capital invested in the field. We could have put the money in the bank. The State's position is you never get your deposit back.
- o About \$2.0 million is pipeline profits. Pipeline profits are dictated to the industry by the FERC settlement agreement which the State of Alaska and the pipeline owners signed.
- o About \$.5 million is federal income tax. The Erickson presentation uses a rate under 34 percent. On a cash basis our federal taxes in the future will exceed 34 percent because our tax depreciation will be significantly less than book depreciation.
- o About \$1.5 million is a difference in price. Our average price over the last 3 years is between \$1.50 and \$2.00 lower than OMB's price. Therefore, our actual profits are less.

\$ MILLIONS

BP Exploration (Alaska) Inc.	<u>'86</u>	<u>'87</u>	<u>'88</u>	<u>AVG</u>
After Tax Income	\$140	\$909	\$560	\$536
Payments to State	\$604	\$897	\$751	\$750
Capital and Exploration Costs	\$698	\$278	\$341	\$438

- o Income minus investment is \$98 million per year, less than \$1/2 million per day for 47 percent of the production. Industry wide the figure would be under \$1 million.

**STATE:** The current tax rates at Prudhoe Bay and Kuparuk are too low. They are immensely profitable and can afford to pay more. The State is not getting its fair share.

**INDUSTRY:** From 1981 through June 1987, the State's share was always more than the 30 percent fair share level. This is based on studies by the Department of Revenue.

Since June 1987, when the ELF "rounding" rule expired for Prudhoe Bay, the State's share has still been above 30 percent. Based on the present official price forecast of \$7.36 for FY 89, the State is currently receiving almost half (49%) of the wellhead value of the oil after lifting costs and depreciation are taken out. The industry's share is 34 percent.

Over the last 3 years - for every \$1 BP Exploration has earned after tax, it paid the State of Alaska \$1.40.

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The current contention by OMB that the number is 29 percent is based on \$18 oil. That price is \$5.11 higher per barrel than the FY 1990 mid-price forecast in October. With this price, state revenues would jump by about \$700 million in FY 90. Presumably, the extra \$700 million will more than offset the extra \$100 million for the proposed ELF change.

Without more detail, it is impossible to check the OMB figures, although there probably is pipeline income included. Pipeline income should be excluded because severance tax is a tax on production and not transportation. Also, the income earned on the pipeline is dictated by the FERC settlement agreement which the State of Alaska signed along with members of the industry.

Based on the Department of Revenue's October Forecast, the industry is making \$1.48 per barrel from its production activities. Compared to \$1.48, a 25¢ tax increase, even after federal income tax effects, is a significant amount.

**STATE:** The current tax rates at Prudhoe Bay and Kuparuk are too low. They are immensely profitable and can afford to pay more. Foreign countries and other states get far more than Alaska and the U.S.

**INDUSTRY:** Over the last three years, for every \$1 BP Exploration has earned after tax, they have first paid the State \$1.40.

Prudhoe Bay's current production tax rate is within 1 percent of the highest rate in the U.S. Passage of SB 97 or HB 118 would give Prudhoe Bay the highest rate in the nation by almost 2 percent.

The costs in Alaska are far higher per barrel than foreign countries. The production costs are several dollars higher. There is a pipeline charge of over \$3 and there is high cost Jones Act water transportation.

Second, foreign nations often grant concessions to large areas of land, instead of making it available in much smaller, leased parcels as Alaska does.

Third, the regime in many foreign nations allows the oil company to recover its exploration costs and some or all of its development costs before the host government starts taking its share. That means that the State would have received no taxes or royalties until the industry had recovered its \$30 billion plus investment. This is very different from leasing on a bonus-bid basis, which has been the method primarily used by Alaska.

The most nearly comparable situation in Alaska is its net profits share leases. Under those leases, the State's net profits share does not start to be paid until the lessee has recovered its development costs, plus a reasonable rate of return on its investment. The rate of return was specified by the State when it put the lease up for bid. For one lease at Endicott, SOHIO and three Alaska Native Regional Corporations bid a net profits share of over 79 percent for the State. Once the development costs and return are recovered, the State's share of the "economic rent" from this lease will be very comparable to that of the United Kingdom for properties in the North Sea that have similarly paid off their investments.

**STATE:** The current tax rates at Prudhoe Bay and Kuparuk are too low. There will be no effect on production with an ELF change.

**INDUSTRY:** When you increase the tax burden, the economics of projects get worse. At this point in the fields' lives and with low prices, many new projects are at the margin. These projects could go away with higher taxes alone. Additionally, there is less money to reinvest. Profits over the last three years are not high to begin with.

The industry must now guess if this is the first in a wave of higher oil taxes to support out-of-control state spending.

Over the next five years, BP plans to invest \$2.0 to \$2.5 billion in North Slope development. That's both to develop and explore, because there are still good things to go after, and to develop the reserves we have remaining.

If we can repeat our past experience, investing that \$2.0 or \$2.5 billion will allow for an additional 750 million barrels of Alaska oil production.

That spending plan would be reassessed with an ELF change.

As reported in the Anchorage Daily News on March 15 (page A8) in a statement attributed to Paul Liebman, an oil analyst for First Boston Corp.,

"To the extent that you're always changing the rules of the game, it just affects one's ability to plan in the future and throws a monkey wrench into projects that may be borderline. And, let's face it, there are a lot of projects in Alaska that are borderline at today's prices."

**STATE:** Without the money, the State will lose thousands of workers. An ELF change will not affect industry employment.

**INDUSTRY:** Strong state economies and strong national economies are powered by private enterprise, not excessive government spending. The proposed ELF change is an attempt to perpetuate Alaska's dependence on government spending at a rate 4-1/2 times the average for other states. In the short term, there may be more state workers just as there were in the boom years of the early 80's. In the medium term, it will become apparent that state spending cannot be maintained no matter what the oil industry is required to contribute. The dislocation that follows will be far more severe than if the money was left in the private sector now.

An ELF change will hurt projects like Hurl State which will add 37 million barrels to Prudhoe recovery. Hurl State will add 300 Alaskan construction jobs over a two year period. Some \$12 million of modules will be built in Fairbanks.

**STATE:** There is a technical problem with the ELF which gives an unintended windfall for drilling unnecessary wells.

**INDUSTRY:** The industry has not drilled unnecessary wells to gain an ELF benefit. Hundreds of wells were drilled at Prudhoe Bay between 1981 and 1987 which had no effect on the ELF in that period because the Prudhoe rate was a constant 15 percent. Extra wells are drilled to increase or sustain production.

**STATE:** The 1981 oil tax legislation was supposed to be almost revenue-neutral. Instead, the State has lost a billion dollars in FY 82 - FY 87.

**INDUSTRY:** First, the correct figure is \$670 million, according to the Department of Revenue's presentation to the House Resources Committee in February of this year.

The billion-dollar figure is based on the assumption that there would not have been a deduction for the federal Windfall Profit Tax under the state separate-accounting income tax if separate accounting had not been repealed in 1981. In fact, however, the legal advice the State received in 1981 said that there would have to be a deduction for WPT or else the chance of losing the lawsuit over separate accounting would be materially increased. Since the State wanted to win that lawsuit, there would have been a WPT deduction at least until the U.S. Supreme Court decided the case in 1985. Since oil prices declined from 1981 to 1985 - even before their collapse in 1986 - the impact of the WPT deduction would have already occurred before it could have been repealed after the Supreme Court's decision.

Second, the Legislature was advised by industry that the 1981 legislature would produce about 94 percent of the revenue that would be collected without that legislation, assuming that separate-accounting was ultimately upheld. In fact, during FY 82 - FY 87 the State has collected 93.2 percent of what it would have collected under the prior law, according to the same Department of Revenue presentation to House Resources last February.

**STATE:** Governor Hammond now says that he expected a change after the ELF kicked back in for Prudhoe Bay.

**INDUSTRY:** When Governor Hammond signed the 1981 legislation, it was recognized that there would be a drop in the production tax on Prudhoe Bay with the ELF stopped being "rounded" to one (1.0). This was going to happen in either of two possible ways. One would be when Prudhoe Bay reached its tenth anniversary in June 1987, when the rounding rule would expire for it. If this happened, the expected effect was about a 20 percent drop in production tax from that field (other fields would be unaffected). The other way the rounding could stop would be if, prior to June 1987, the computed value of the ELF for Prudhoe fell below 0.7 and would no longer be rounded upward to one. In this case the drop would be over 30 percent.

Recognizing that one or the other of these events was going to happen, Governor Hammond noted that if the revenue consequences for the State would be too great, he had full confidence in the ability of future legislatures to deal with it.

In fact, the State's share has continued to be above the minimum "fair" level of 30 percent since 1987, when the 10 years ran out for Prudhoe Bay. It is nearly half of the production revenue after operating costs. Even factoring in pipeline profits (a strange thing to consider, given that the ELF relates to a production tax and not a pipeline tax), the State's share is 35 percent this year.

Given that the State is still receiving its fair share, there is no need to change the ELF on the basis of what Governor Hammond said in 1981.

**STATE:** The proposed ELF changes will accelerate the startup of marginal fields.

**INDUSTRY:** The State has brought forward no producers at any field who have indicated that the proposed changes will accelerate or make possible the opening of any small fields.

The ELF automatically takes care of fields as they become marginal, because it starts with the percentage of production that is needed to cover the operating costs. If this "cost percentage" is high (as it would be when the field is getting marginal), the remaining percentage of the production representing potential profit is small. The ELF is based directly on this "profit percentage," so a small "profit percentage" means the ELF is small. A small ELF means a low tax rate.

Milne Point, for example, paid no production tax in the period prior to its shutting in. BP experience suggests that small field development is dependent on factors unrelated to production tax, e.g. at both Endicott and Niakuk, permitting and the use of causeways is of more direct significance than the production tax. Similarly, it would seem that the effective 18% royalty at Milne Point is the more proximate cause of Milne Point's difficulties and not a 3% or 4% production tax rate which will continue to drop under current law.

## ILLUSTRATION OF HOW "ELF" WORKS

Explanation. The present oil ELF formula has two basic parts -- a base and an exponent, which is the power to which the base is raised. For example,  $(0.9)^2$  means 0.9 is the base, and 2 is the exponent. 0.9 raised to the second power means 0.9 times 0.9, which equals 0.81. (The statute uses "exp" instead of "0" to indicate an exponent.)

For the ELF, the base is always less than one and as small as zero. The exponent is usually 460/300, or 1.533333. Because this exponent is larger than one, when it is applied to the ELF base number, the result is a number smaller than the base number.

This property of the exponent was illustrated above, when we saw that 0.9 to the second power is 0.81. Raising 0.9 to the power of 1.533333 equals 0.85082. Note that this is not as small a number as we got when we raised 0.9 to the second power. This shows another aspect about the exponent: the larger the exponent is, the smaller the result is when a particular ELF base number is raised to that exponent. Conversely, the smaller the exponent is, the larger the result is. When the exponent drops below one, the result will actually be larger than the original ELF base number. This latter property of the exponent becomes important only when the presumption is rebutted about 300 B/D per well being the break-even production rate.

The ELF base answers the question, what percentage of current production is deemed to represent profit. It does this by asking what fraction of the production is needed to cover the most fundamental operating costs. Once this fraction is determined, all the rest of the production is deemed to represent profit.

The amount of production needed to cover the most fundamental operating costs is called the "production rate at the economic limit," or "PEL" as it is called in the statute. For simplicity, let's call PEL the "break-even rate." It is presumed that the break-even rate is 300 barrels a day per well. The fraction of current production needed to cover these fundamental operating costs is simply the break-even rate divided by the current rate of production. Subtracting this fraction from one gives us the fraction of the production that is deemed to represent profit. Thus, the base of the ELF is --

$$1 - \frac{\text{break-even rate}}{\text{current production rate}}$$

or, as the statute expresses it,  $[1-(\text{PEL}/\text{TP})]$ . PEL is the break--even rate, and TP is the current production rate.

When the presumption is not rebutted, the break-even rate equals 300 times the number of "well days" during any given month (the tax is computed and paid on a monthly basis). The number of well days is simply the number of hours that the wells were in production that month, divided by 24.

The ELF exponent is 460 times well days, divided by PEL. When the presumption for PEL is not rebutted, PEL equals 300 times well days. Thus, well days is a factor in both the numerator and the denominator of the exponent, and it cancels itself out. This simplifies the exponent to  $460/300$ , or 1.533333.

#### Example 1. Unrebutted Presumption.

Suppose the presumption of 300 B/D per well has not been rebutted for a field that produces an average of 1.2 million B/D from 120 wells that all operated continuously during a 30-day month. The number of well days equals 120 wells times 30 days each, or 3600.

The ELF base starts with the ratio of the break-even rate to the current rate of production, and then subtracts that from one to come up with the fraction of current production that is deemed to represent profit. In this example, the break-even rate is 300 barrels a day times 3600 wells days in the month, or 1,080,000 barrel a month. Current production during the month is 1,200,000 barrels a day times 30 days, or 36,000,000 barrels. The ratio of the break-even rate (PEL) to the current rate (TP) is 1,080,000 divided by 36,000,000 -- or 0.030000. Subtracting this fraction from one gives us the fraction of production deemed to represent profit, or 0.970000. This is the base number for the ELF.

The ELF exponent is 460 times well days, divided by PEL. Since the presumption is not rebutted, PEL equals 300 times well days. Thus the exponent is simply the fraction

$$\frac{460 \times \text{Well Days}}{300 \times \text{Well Days}}$$

As you can see, the well days cancel each other out, leaving just  $460/300$ , or 1.533333. The final ELF equals the base of 0.970000, raised to an exponent of 1.533333. This equals 0.954370.

#### Example 2. Rebutted Presumption.

Suppose everything is the same as in Example 1 except that the presumed break-even rate of 300 B/D per well has been rebutted and, instead, it has been shown that the field's actual break-even rate is 3,600,000 barrels per month (an average of 1,000 B/D per well).

The ratio of the break-even rate to the current production rate is now 3,600,000 barrels a month divided by actual production of 36,000,000 during the month, or 0.100000. Subtracting this fraction from one gives the fraction of the production deemed to be profit, or 0.900000. This is the new ELF base.

The ELF exponent also changes. Now it is 460 times well days, divided by the new break-even rate of 3,600,000 barrels a month. Since there are 3,600 well days in the month, the exponent equals 460 times 3,600, divided by 3,600,000 - - or 0.460000. Notice that the new exponent is less than one. This means that the result of applying the exponent will be something larger than the base of 0.900000 that it is applied to. In fact, the result of raising the new base of 0.900000 to the new exponent of 0.460000 is 0.952690.

This new ELF is almost the same as the 0.954370 that we got when the presumption was not rebutted -- in fact the new ELF is smaller than the first one by only 0.001680. In other words the tax will still be over 99% of what it would have been if the presumption had not been rebutted. This illustrates why the exponent was put into the formula in 1977. It was there to prevent the ELF from getting small as the result of rebutting the presumption while a large field like Prudhoe Bay was still in the early stages of development. True, rebutting the presumption would decrease the fraction of production that is deemed to represent profit, but this would be partially offset by the reduction in the size of the exponent. As this example shows, the two effects tended to offset each other almost exactly.

## ALASKA'S FAIR SHARE

From 1981 through June 1987, the State's share was always more than the 30 percent fair share level. This is based on studies by the Department of Revenue.

Since June 1987, when the ELF "rounding" rule expired for Prudhoe Bay, the State's share has still been above 30 percent. Based on the present official price forecast of \$7.36 for FY 89, the State is currently receiving almost half (49%) of the wellhead value of the oil after lifting costs and depreciation are taken out. The industry's share is 34 percent.

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## ECONOMIC LIMIT FACTOR

### G.N. Nelson Testimony

Madam chairman and members of the committee:

For the record, my name is George N. Nelson, and I am president of BP Exploration (Alaska) Inc.

In 1986, you knew us as Sohio Alaska Petroleum Company.

In 1987 and 1988, you knew as Standard Alaska Production Company.

And now in 1989, we are the same company with a new name. Now we're known as BP Exploration and I hope this will be the last name change, as I am sure you will agree. This is not what we think of as stability.

With me today is Tom Williams. Most of you already know him. I consider Tom to be the most knowledgeable person in the state on the subject of the ELF; he fathered it when he was Director of Petroleum Revenue.

You may be wondering why I'm here testifying when he knows more about the history of ELF and the formula. It's because this bill is about producing oil, and that's been my job for the past 30 years.

I started in the oil business in Venezuela in 1955. Back then, Venezuela was viewed a lot like Saudi Arabia is today -- its reserves seemed unlimited. But then a funny thing happened in 1957. The government increased taxes on the oil business retroactively to the tune of \$380 million. And there hasn't been another major oil field discovery since then.

I, like most others, moved on shortly after Venezuela's tax policy changed. I went to Libya, where I stayed from 1967 through 1975. Libya also has taken a high-tax, high-government-control approach. As a result, Libya's production hasn't met its potential, either.

Since 1975, I've worked on the Prudhoe Bay field. Our company has a 50% interest in Prudhoe, a 38% interest in Kuparuk, a 56% interest in Endicott and a 20% interest in Lisburne.

I mention this background because I think we can learn from the past. But we can't *live* in the past, and it appears to me after looking over the testimony in the House version of the most recent ELF bill that there's a dangerous emphasis on the past with no look to the future. Tom can answer your questions about what happened with ELF between 1977 and 1981, but I want to talk about the future.

How important are giant oil fields like Prudhoe Bay, and how much tax and royalty should they pay? Without Prudhoe, there would have been no \$10 billion investment in the Trans Alaska Pipeline. There would be no Kuparuk. No Endicott. No Lisburne.

Without a large, commercial field in ANWR, there will be no pipeline from ANWR to TAPS. Without the potential for a large commercial find in ANWR, there would be no incentive to spend hundreds of millions of dollars to explore there.

Over the next decade, the vast majority of the new oil reserves on the North Slope should come from Prudhoe Bay and Kuparuk. *Should* come from from Prudhoe Bay and Kuparuk. But it will only happen if there's a commercial incentive to fully develop these two giant oil fields.

Senate Bill 97 would accomplish exactly the opposite. We would pay a lower tax rate on Prudhoe production of 1.4 million barrels a day than on 1.5 million barrels a day. The bill is written to reward *less* production from large and small fields alike. The message: Don't invest money to boost recovery. Lower production will be rewarded with lower tax rates.

Is this really what you intended? I don't think so.

Prudhoe and Kuparuk have been characterized as extremely profitable oil fields that can -- and should -- pay as much tax now as they did when prices were

twice what they are now. During the first half of the '80s, they *were* highly profitable. *And Alaska shared fully in that profit.* Between 1980 and 1986, the state collected nearly \$25 billion in taxes and royalties. That's more than \$7,000 per resident per year. Put another way, an Alaskan family of four had some \$200,000 in taxes and royalties paid on their behalf by the oil industry during this period.

But the heyday is over, and I, for one, don't think the state *or* the industry will see times like those again, at least not in this century.

Since 1986, our North Slope operations have been far less profitable. Based on our own experience, the oil industry's return on North Slope investment between 1986 and 1988 averaged about 10% a year. Compare that to the Alaska Permanent Fund, which, pursuing a conservative investment policy of avoiding risks, has generated a 12% average annual return over the same period.

During this three-year period, we've reported some \$540 million a year in after-tax profits from North Slope production. During the same period, we paid the State of Alaska and its municipalities some \$750 million a year in taxes and royalties on North Slope production. During the same period, we've reinvested 80% of our production profits in North Slope exploration and development -- an average of more than \$430 million a year.

When the state's oil and gas tax legislation was last overhauled in 1981, there was a consensus between the legislative leadership and the administration that the state's "fair share" of the oil wealth should never fall below 30%. This corresponded with roughly a third for the state, a third for the industry and a third for the federal government.

According to studies by the Alaska Department of Revenue, the state's share was always more than 30% between 1981 and June of 1987. We know, and administration statements confirm, that the state share is still above 30%.

Based on the state's current official price forecast of \$7.36 (wellhead value) for FY'89, the state is receiving almost *half* -- 49% -- of the wellhead value of oil after lifting costs and depreciation are taken out. The industry's share is roughly a third -- 34%. Even using the administration's numbers, which are based on a value at Valdez and include pipeline tariffs, the state's share is 36%.

Plenty of things besides oil prices have a significant impact on the profitability of Prudhoe and Kuparuk. Two of the most important are costs and the level of production.

Prudhoe has been producing oil for nearly 12 years now, and Kuparuk's been producing for more than seven. As you know, the North Slope has one of the

harshest climates in the world. Because maintenance costs were higher than anticipated, our expenses surpassed our budget by some \$40 million last year alone. Now that our Prudhoe Bay facilities are operating at capacity, we can no longer make up for production lost due to maintenance, weather conditions or complications with tanker shipments. That means we're spreading higher costs over fewer barrels. Costs will continue to rise, and production will continue to decline.

So what exactly does this have to do with ELF? ELF takes into account the fact that oil production doesn't become marginal overnight. It's a gradual process, and that's how the ELF responds.

Prudhoe Bay currently pays about a 12% production tax. That's a very high rate -- far higher than the 4.9% rate in Texas and 7.1% in Oklahoma, but it's 3% lower than it was. Prudhoe was subject to the 10-year rounding rule until June of 1987. ELF links the payment of taxes to the ability to pay them, and that's good tax policy.

The ELF also contains an incentive to drill new wells and to maximize recovery from existing ones. This incentive will play a key role in slowing the decline in production at Prudhoe Bay and Kuparuk.

It's also creating private-sector jobs for Alaskans and millions of dollars in revenues for Alaskan contractors. Consider the example of our Hurl State development -- a small, marginal development within the huge Prudhoe Bay field.

Hurl State represents an investment of some \$80 million, and it will boost recovery at Prudhoe by 37 million barrels. That's 37 million barrels more for the state to tax and collect royalties.

Just as important, it means jobs for Alaskans. In all, Hurl State will create some 300 construction jobs over a two-year period. And we've already demonstrated our commitment to use Alaskan contractors to perform the work. We recently awarded some \$12 million in contracts to Alaskan firms to perform a portion of the work on Hurl State.

Union *and* non-union firms.

Anchorage *and* Fairbanks.