

Northeast British Columbia Natural Gas Discoveries of the Decade 1990 – 1999

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ABSTRACT

A total of 568 gas pools were discovered in British Columbia in the 1990's, with a total of 8.3 Tcf gas-in-place, 6.4 Tcf recoverable, and initial marketable gas reserves of 5.2 Tcf. This represents 38% of the total number of pools and 23% of the total initial marketable gas discovered to December 31, 2001. The largest pool discovered in the decade is Helmet North Jean Marie A with marketable gas reserves of 338 Bcf, followed by Maxhamish Lake Chinkeh A with 283 Bcf. The average pool size is 9.2 Bcf, with a median of 3.2 Bcf. There were a total of 18 pools, containing 1.9 Tcf (37%), with marketable gas reserves greater than 50 Bcf. One third (190) of the pools have reserves less than 2 Bcf.

The top ten pools of the decade contain 1,435 Bcf of marketable gas, 27% of the total discovered. The largest number of discovered pools was in the middle part of the decade, with the largest number, 89, in 1994. The years with the largest volume of gas were 1991 and 1994.

By structural area the largest volume of gas was discovered in the northern plains region (2.7 Tcf), followed by the Grizzly Foothills (2.2 Tcf). By stratigraphic horizon the largest marketable gas volume, 1,596 Bcf in 85 pools, was in the Pardonet – Baldonnel, followed by the Halfway with 645 Bcf in 121 pools.

GAS DISCOVERIES 1990 - 1999

In the 1990's 568 gas pools (non-associated, associated and solution) were discovered with gas-in-place of 8,282 Bcf, and initial marketable gas reserves of 5,234 Bcf. The gas pools discovered in the 1990's represent 38% of the total number of pools discovered and contain 23% of the marketable gas. The first 40 pools by initial marketable gas are listed in table 1. Non-associated gas accounts for 94% of the initial marketable gas in 87% of the pools. A statistical summary of the pools, including reservoir characteristics, is presented in table 2.

The 20 largest discoveries are shown in figure 1. The largest gas pool discovery of the 1990's is Helmet North Jean Marie A discovered in 1990 with initial established marketable gas reserves of 338.5 Bcf., followed by Maxhamish Lake Chinkeh A, discovered in 1991, with initial marketable gas of 283.0 Bcf. The top 20 pools ranked by marketable gas contain 2,017 Bcf, which is 38.5% of the total discovered in the decade. For the top 20 pools 976 Bcf (48%) has been produced as of December 31, 1999.

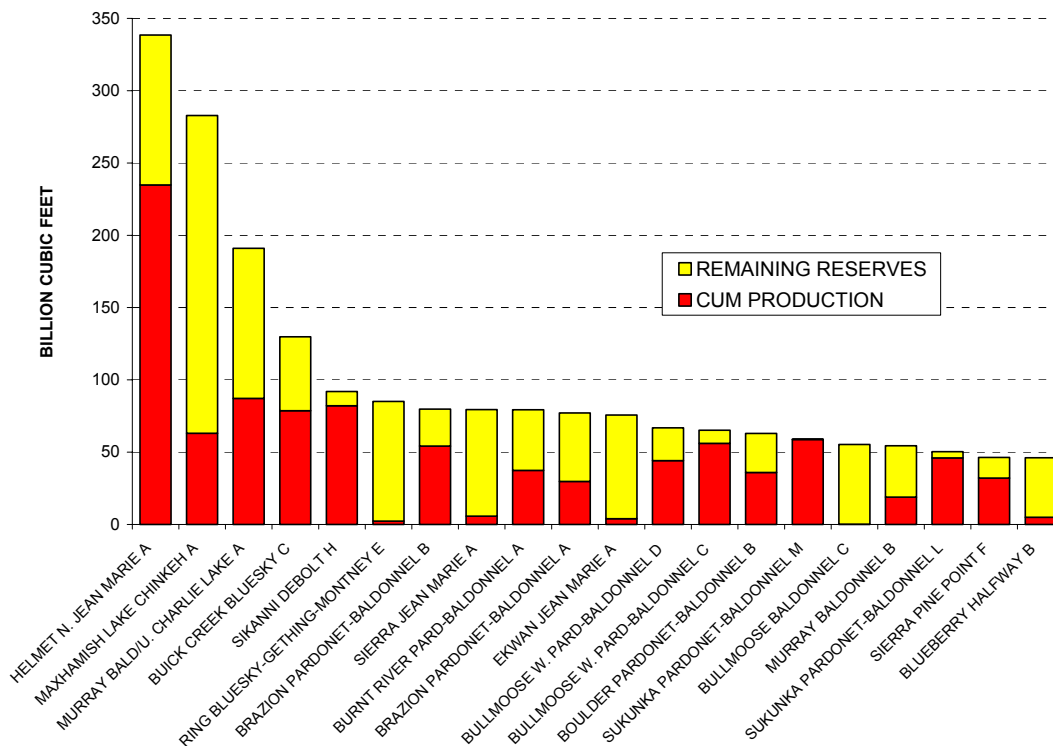


Figure 1: Top 20 gas pools by initial marketable gas, 1990 - 1999

The Northern Plains had the largest number of discoveries, 245 pools with 1,756 Bcf of marketable gas, followed by the Peace River Arch, with 190 pools, and 1,292 Bcf. Excluding the Liard Basin which had only one discovery, Maxhamish Lake Chinkeh A, with 283 Bcf marketable gas, the largest average pool size was 30.7 Bcf in the Grizzly Foothills. The overall average pool size for the 1990's is 9.2 Bcf, marketable gas.

Figure 2 shows the historical trend, of the mean, median and 95th percentile for Northeast British Columbia gas pools by decade. Note the mean and 95th percentile values are all decreasing. However the rate of decrease is becoming less in recent decades, and the next decade should be only slightly lower than current values. The median pool size has had a slight increase in the last two decades. For the period, 1990 to 1999, the average pool size is 9.2 Bcf, and the median is 3.2 Bcf. The 95th percentile is 33.7 Bcf., that is 5% of the pools discovered in the 1990's larger than 33.7 Bcf, and the trends suggest the next decade could be very similar.

The gas-in-place, recoverable and marketable gas by year of discovery is shown in figure 3. The largest number of pools, 89, was discovered in 1994. The largest volumes of gas were discovered in the years 1991 and 1994.

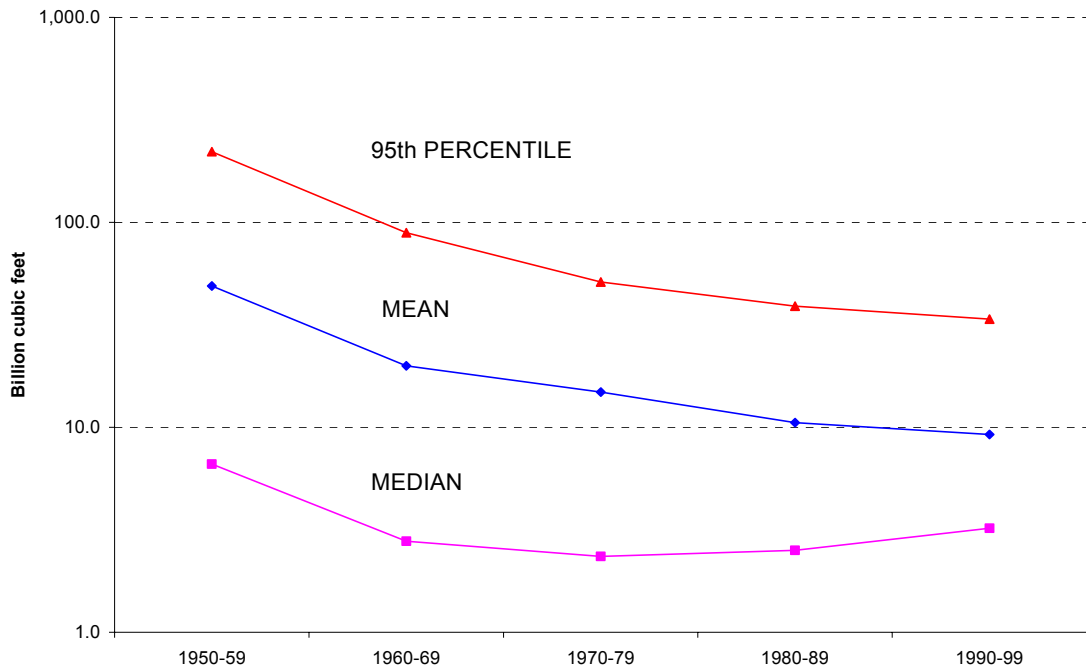


Figure 2: British Columbia - initial marketable pool size by decade discovered

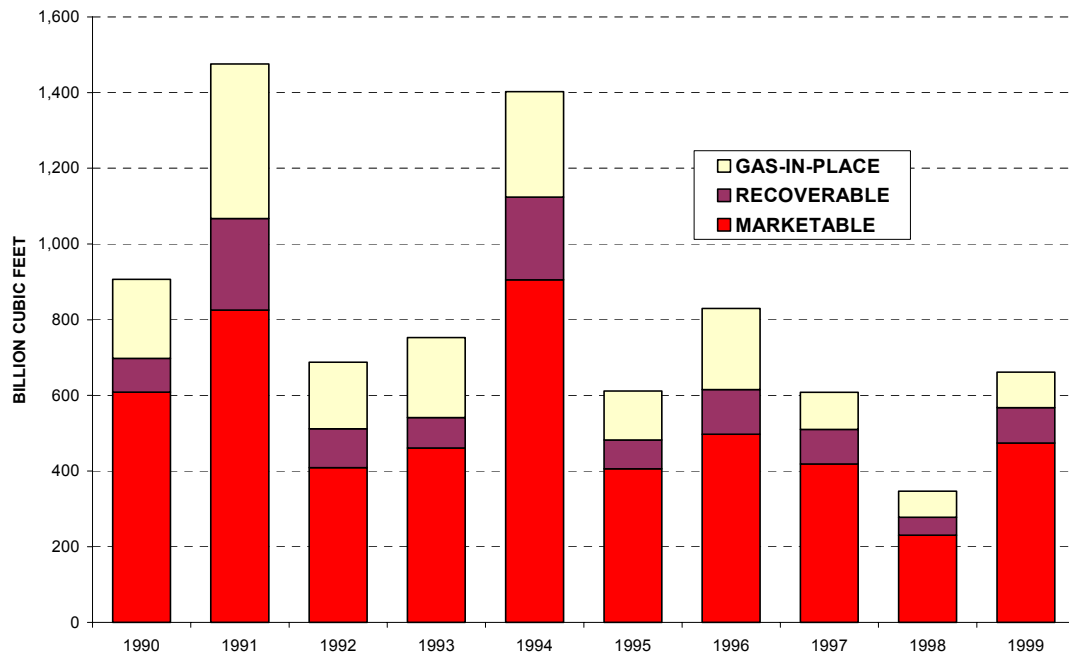


Figure 3: Northeast British Columbia natural gas by decade, 1990 - 1999

NORTHEAST BRITISH COLUMBIA GAS POOLS - DISCOVERED 1990 - 1999
POOL SIZE DISTRIBUTION
 INITIAL MARKETABLE GAS (Billion Cubic Feet)

Size Bcf	No. of Pools	IMG Bcf	% of Pools	Cum % Pools	% of IMG	Cum % IMG
0.05	1	0.0	0.2%	100.0%	0.0%	100.0%
0.1	6	0.5	1.1%	99.8%	0.0%	100.0%
0.2	6	0.9	1.1%	98.8%	0.0%	100.0%
0.5	26	8.6	4.6%	97.7%	0.2%	100.0%
1	51	40.2	9.0%	93.1%	0.8%	99.8%
2	100	152.4	17.6%	84.2%	2.9%	99.0%
5	171	553.6	30.1%	66.5%	10.6%	96.1%
10	95	671.3	16.7%	36.4%	12.8%	85.6%
20	62	890.2	10.9%	19.7%	17.0%	72.7%
50	32	992.4	5.6%	8.8%	19.0%	55.7%
100	14	981.9	2.5%	3.2%	18.8%	36.8%
200	2	320.7	0.4%	0.7%	6.1%	18.0%
500	2	821.4	0.4%	0.4%	11.9%	11.9%
1000	0	0.0	0.0%	0.0%	0.0%	0.0%
2000	0	0.0	0.0%	0.0%	0.0%	0.0%
Total	568	5,234.2				

Total Number of Pools	568
Initial Marketable Gas	5,234
Largest Pool	338
Mean Pool Size	9.2
Median Pool Size	3.2
95th Percentile	33.7
90th Percentile	17.9
75th Percentile	7.9
25th Percentile	1.5
10th Percentile	0.7
5th Percentile	0.4

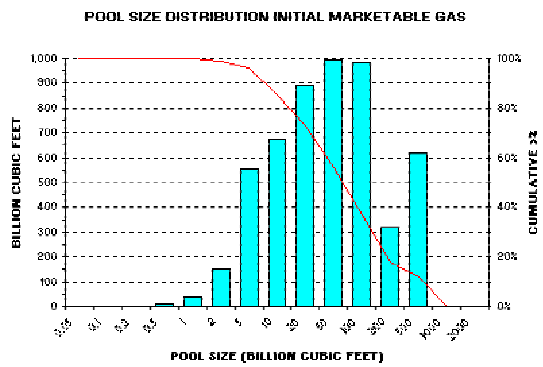
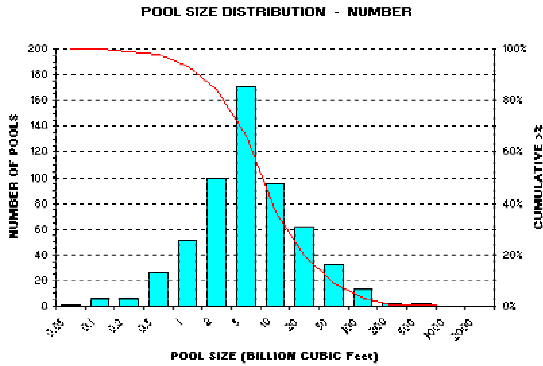


Figure 4: 1990 -1999, Pool size distribution of gas pools

The pool size distribution, number and marketable gas, is shown in figure 4. There are a total of 18 pools greater than 20 Bcf (3.2% of the total), with 1,924 Bcf (36.8%) of marketable gas. There are 90 pools (16%), with less than 1 Bcf of marketable gas. The most commonly occurring pool size class (mode) is the range 2 to 5 Bcf, with 30% of the pools. The largest volume of gas is in the 20 to 50 Bcf range, with 19% of the initial marketable gas.

References

British Columbia Oil and Gas Commission, 2002, Hydrocarbon and By-Product Reserves in British Columbia, 2001.

British Columbia Oil and Gas Commission, 2001 Gas Pool Reserves Database.

FIELD POOL NAME	Year of Discov.	Gas in Place (Bcf)	Recov. Gas (Bcf)	Initial Mkt. Gas (Bcf)	Cum Mkt Prod. (Bcf)	Rem. Mkt. Gas (Bcf)	Gas Type
HELMET NORTH JEAN MARIE A	1990	393.66	354.30	338.46	234.82	103.64	NAS
MAXHAMISH LAKE CHINKEH A	1991	422.86	317.14	282.96	63.11	219.85	NAS
MURRAY BALDONNEL/UPPER CHARLIE LAKE A	1994	299.98	269.98	190.96	87.14	103.81	NAS
BUICK CREEK BLUESKY C	1992	178.95	152.11	129.79	78.55	51.24	NAS
SIKANNI DEBOLT H	1993	119.28	95.42	91.89	82.12	9.77	NAS
RING BLUESKY-GETHING-MONTNEY E	1996	112.35	89.88	85.05	2.24	82.81	NAS
BRAZION PARDONET-BALDONNEL B	1994	104.98	94.48	79.67	54.29	25.38	NAS
SIERRA JEAN MARIE A	1999	104.84	94.36	79.40	5.80	73.60	NAS
BURNT RIVER PARDONET-BALDONNEL A	1994	103.02	92.71	79.29	37.44	41.85	NAS
BRAZION PARDONET-BALDONNEL A	1991	104.14	93.73	77.00	29.65	47.35	NAS
EKWAN JEAN MARIE A	1995	107.63	86.11	75.73	3.96	71.77	NAS
BULLMOOSE WEST PARDONET-BALDONNEL D	1992	96.24	86.62	66.78	44.08	22.70	NAS
BULLMOOSE WEST PARDONET-BALDONNEL C	1991	95.86	86.27	65.20	56.06	9.15	NAS
BOULDER PARDONET-BALDONNEL B	1994	94.74	75.79	62.88	35.86	27.02	NAS
SUKUNKA PARDONET-BALDONNEL M	1993	106.15	74.31	59.05	58.65	0.40	NAS
BULLMOOSE BALDONNEL C	1991	115.14	103.63	55.32	0.08	55.24	NAS
MURRAY BALDONNEL B	1997	87.13	78.41	54.40	18.98	35.41	NAS
SUKUNKA PARDONET-BALDONNEL L	1992	99.38	74.54	50.28	45.89	4.39	NAS
SIERRA PINE POINT F	1991	76.03	64.62	46.44	32.13	14.31	NAS
BLUEBERRY HALFWAY B	1999	64.14	57.72	46.07	4.93	41.15	NAS
GRAHAM BALDONNEL D	1993	51.67	46.50	44.34	10.71	33.63	NAS
OTHER DEBOLT A-051-H/094-B-10	1997	50.16	45.14	40.92	2.32	38.61	NAS
AITKEN CREEK NORTH BLUESKY A	1991	50.07	45.07	38.32	24.19	14.13	NAS
GRAHAM BALDONNEL A	1992	79.57	39.78	37.79	22.84	14.95	NAS
STODDART WEST DOIG E	1996	94.76	52.65	37.60	18.23	19.38	ASN
MONIAS HALFWAY T	1999	48.39	43.55	37.14	1.41	35.73	NAS
SEXTET SLAVE POINT D	1996	49.41	44.47	35.99	14.01	21.98	NAS
KAHNTAH RIVER MONTNEY A	1994	38.18	34.36	33.92	18.46	15.46	NAS
CHINCHAGA RIVER BLUESKY-GETHING-DETRITAL A	1994	43.95	35.16	33.83	16.91	16.92	NAS
SUKUNKA PARDONET-BALDONNEL P	1994	60.85	54.76	33.54	32.13	1.41	NAS
PEGGO-PESH JEAN MARIE B	1997	37.72	33.95	32.36	3.10	29.26	NAS
SWAN LAKE MONTNEY A	1997	38.34	34.50	31.64	0.81	30.83	NAS
KLUA PINE POINT L	1999	47.06	37.65	30.51	2.02	28.50	NAS
OTHER DEBOLT B-085-E/094-G-02	1994	39.26	31.40	30.25	18.50	11.74	NAS
SUKUNKA PARDONET-BALDONNEL H	1991	64.96	45.47	29.56	5.51	24.06	NAS
PICKELL NOTIKEWIN A	1997	37.47	33.72	29.45	5.50	23.96	NAS
CLARKE LAKE PINE POINT C	1993	50.22	35.16	27.89	5.62	22.27	NAS
HIGHHAT MOUNTAIN PARDONET-BALDONNEL C	1996	51.49	41.20	27.69	1.68	26.01	NAS
CHINCHAGA RIVER LOWER CHARLIE LAKE/MONTNEY A	1994	31.70	28.53	27.46	24.15	3.31	NAS
INGA HALFWAY E	1990	46.44	37.15	26.11	5.78	20.34	NAS

Table 1: Northeast British Columbia - Largest 40 pools discovered in the 1990's

**NORTHEAST BRITISH COLUMBIA
GAS POOLS DISCOVERED 1990 - 1999**
(BC ENERGY & MINES December 31, 2001)

Year of first discovery	1990	
Original Gas-in-Place	8,281.6	BCF
Raw Recoverable Gas	6,393.0	BCF
Initial Marketable Gas	5,424.5	BCF
Raw Gas Recovery Factor (% of GIP)	77.2%	
Marketable Gas Recovery Factor (% of GIP)	65.5%	
Largest Pool (Gas-in-Place)	422.9	BCF
Largest Pool (Recoverable)	354.3	BCF
Largest Pool (Marketable)	338.5	BCF
Smallest Pool (Recoverable)	0.046	BCF
Smallest Pool (Marketable)	0.039	BCF
Number of Pools	568	
Average Pool Size (Gas-in-Place)	14.6	BCF
Average Pool Size (Recoverable)	11.3	BCF
Average Pool Size (Marketable)	9.5	BCF
Total Productive Pool Area	850,603	Acres
Largest Productive Pool Area	90,574	Acres
Smallest Productive Pool Area	3	Acres
Average Productive Pool Area	1,783	Acres
Ave. Rec. Mcf/Ac-Ft	409.8	MCF/AC-FT
Maximum Pay	310	Feet
Minimum Pay	1.6	Feet
Average Pay	33.1	Feet
Maximum Porosity	0.265	
Minimum Porosity	0.008	
Average Porosity	0.125	
Maximum Gas Saturation	0.966	
Minimum Gas Saturation	0.300	
Average Gas Saturation	0.758	
Deepest Pool Depth	16,066	Feet
Shallowest Pool Depth	1,339	Feet
Average Depth	5,035	Feet
Maximum Gas Density	1.095	
Minimum Gas Density	0.001	
Average Gas Density	0.669	
Average Pressure	1,858.7	Psi
Average Temperature	143.6	°F
Gas In Place Mcf/Prod. Acre	9,736	MCF/Acre
Rec. Gas Mcf/ Prod. Acre	7,516	MCF/Acre
Average Liquids Recovery	23.4	B/MMCF
Maximum 'Z' Factor	1.219	
Minimum 'Z' Factor	0.439	
Average 'Z' Factor	0.870	

Table 2 : Statistical summary of BC gas pools discovered in 1990's