BRITISH COLUMBIA HYDRO
THERMAL GENERATION PROJECTS DIVISION
MINING DEPARTMENT

HAT CREEK PROJECT

800 MW
MINING REPORT

VOLUME 3

APPENDIX B

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OCTOBER 1982

800 MW MINING REPORT

VOLUME 3

APPENDIX B

CONTENTS

TABLES

APPENDIX B

B.1 INTRODUCTION

The 1982 Mining Report has been prepared on the basis of providing fuel for two 400 MW generating units by extracting coal from No. 1 Deposit over a project life of 36 years.

One of the advantages of thermal power generation at Hat Creek is the flexibility available in the development of the power complex. Since mineable coal reserves are available in a confined area in the Hat Creek Valley to feed almost any number of generating units, and sufficient cooling water is available from the Thompson River, the 800 MW complex is only one of a large number of project alternatives.

Prior to 1982, mine planning was based upon feeding four 560 MW generating units (2240 MW total) and detailed capital and operating cost estimates were prepared which have been updated to 1982 dollars.

This Appendix Volume shows the impact on mining costs of varying the scale of the power complex by computing costs for three alternate cases:

- 2240 MW
- 1120 MW
- 400 MW

B.2 2240 MW PLANT

B.2.1 Introduction

The Hat Creek Project was originally planned for four 560 MW units each of which would operate for 35 years. In 1982 the base case was altered to two 400 MW units.

The basis for the 2240 MW Project has been well documented in previous years; specifically in the 1979 Report, and the mining costs have been updated each year. The 1982 update for the 2240 MW mining costs are presented in this section.

B.2.2 Scope Changes from the 1979 Report

The 1982 mining cost update for the 2240 MW Project was based upon the 1979 Mining Report estimate, but refined to allow for the following scope changes:

(1) Start-up of the four units was scheduled for:

- 1 October 1992
- 1 October 1993
- 1 October 1995
- 1 October 1996

whereas the four units started up in successive years in the 1979 report.

(2) The mine production period totals 40 years within which each plant operates for 35 years after its start-up.

(3) Mine staff levels were reduced from the 1979 report to account for the revised management structure defined in 1982.

(4) The overland coal conveyor to the powerplant was shortened because of a powerplant relocation.

(5) Installation of the waste handling system was deferred by 1 year to minimize costs.

(6) Production quantities were revised during the preproduction period to allow certain civil work to be done by construction rather than operations personnel.

B.2.3 Capital Costs

The estimate for fixed capital was prepared in 1982 by assembling written quotations from the major equipment manufacturers using the same equipment specifications developed in the 1979 study. Equipment installation costs were updated by applying 1982 rates for construction labour to the mandays developed in the earlier study. Other adjustments were made to accommodate the scope differences as required.

Preproduction operating costs were capitalized on a somewhat different basis than in previous estimates. Previously all operating costs prior to start-up of the first unit were capitalized, as were varying percentages of succeeding years costs until the last unit was in service. The 1982 estimate capitalizes only the operating costs prior to the start-up of the first unit.

B.2.4 Operating Costs

The operating costs were recomputed following the same general methods as those followed in the 1979 study, but incorporating the following changes:

(1) The estimate was reorganized to conform to the format of the 800 MW operating cost estimate.

(2) Manpower costs were recomputed in accordance with B.C. Hydro's existing IBEW operating labour agreement (i.e. vacations, other time off with pay, etc.).

(3) Minor changes were made in the usage of mobile equipment.

(4) Mobile equipment usage was rescheduled to conform to the revised production schedule.

Mobile equipment operating costs, labour rates and other cost basis were the same as those applied in the 800 MW study.

B.2.5 Total Cost of Coal

The 1982 value for the total cost of coal amounts to $10.40/t produced, which compares with the 1981 estimate of $11.88/t. The difference between these amounts is explained by:

(1) The method of computing corporate overhead was changed resulting in a saving of about $0.05/t plus interest.

(2) The operating contractor's fee allowance was reduced from 10 percent of operating costs to 4 percent since his role was modified to one of providing management services (saving of $0.38/t).

(3) The Provincial coal royalty was calculated by the cost of service computer program rather than input as an operating cost. Because of the effects of escalation, the constant dollar amount for Provincial royalty appears to be reduced ($0.12/t).

(4) The basis for mobile equipment replacement was changed which resulted in a reduction over the life of the project of $0.43/t.

TABLE B.2-1

HAT CREEK PROJECT

2240 MW PLANT

PRODUCTION SCHEDULE

	YEARLY QUANTITIES			CUMULATIVE QUANTITIES		
YEAR	COAL Kt	WASTE PARTINGS KBCM	WASTE KBCM	COAL Kt	WASTE PARTINGS KBCM	WASTE KBCM
-2			1,500			1,500
-1	100		3,000	100		4,500
1	1,530	153	4,500	1,630	153	9,000
2	3,890	389	6,000	5,520	542	15,000
3	5,050	505	6,000	10,570	1,047	21,000
4	5,290	529	6,000	15,860	1,576	27,000
5	6,600	660	11,300	22,460	2,236	38,300
6	8,960	896	12,100	31,420	3,132	50,400
7	10,120	1,012	16,000	41,540	4,144	66,400
8	10,360	1,036	16,000	51,900	5,180	82,400
9	10,440	1,044	16,000	62,340	6,224	98,400
10	10,440	1,044	16,000	72,780	7,268	114,400
11	10,440	1,044	15,100	83,220	8,312	129,500
12	10,440	1,044	15,100	93,660	9,356	144,600
13	10,440	1,044	15,100	104,100	10,400	159,700
14	10,440	1,044	15,100	114,540	11,444	174,800
15	10,440	1,044	15,100	124,980	12,488	189,900
16	10,440	1,044	12,700	135,420	13,532	202,600
17	10,440	1,044	12,700	145,860	14,576	215,300
18	10,440	1,044	12,700	156,300	15,620	228,000
19	10,440	1,044	12,700	166,740	16,664	240,700
20	10,440	1,044	12,700	177,180	17,708	253,400
21	10,440	1,044	10,140	187,620	18,752	263,540
22	10,440	1,044	10,140	198,060	19,796	273,680
23	10,440	1,044	10,140	208,500	20,840	283,820
24	10,440	1,044	10,140	218,940	21,884	293,960
25	10,440	1,044	10,140	229,820	22,928	304,100
26	10,440	1,044	10,140	239,820	23,972	314,240
27	10,440	1,044	10,140	250,260	25,016	324,380
28	10,440	1,044	10,140	260,700	26,060	334,520
29	10,440	1,044	10,140	271,140	27,104	344,660
30	10,440	1,044	10,140	281,580	28,148	354,800
31	10,440	1,044	8,500	292,020	29,192	363,300
32	10,440	1,044	8,500	302,460	30,236	371,800
33	10,440	1,044	8,500	312,900	31,280	380,300
34	10,440	1,044	8,500	323,340	32,324	388,800
35	10,440	1,044	8,500	333,780	33,368	397,300
36	7,830	783	5,000	341,610	34,151	402,300
37	5,220	522	3,000	346,830	34,673	405,300
38	5,220	522	2,000	352,050	35,195	407,300
39	5,220	522	1,000	357,270	35,717	408,300
40	2,610	261	500	359,880	35,978	408,800

TABLE B.2-2

HAT CREEK MINING MANPOWER REQUIREMENTS

2240 MW (1992/93/96/97)

YEAR	1987 /88 -5	1988 /89 -4	1989 /90 -3	1990 /91 -2	1991 /92 -1	1992 /93 1	1993 /94 2	1994 /95 3	1995 /96 4	1996 /97 5	1997 /98 6	1998 /99 7	TOTAL
PLANNING & DEVELOPMENT													
B.C. Hydro	18	16	-	-	-	-							34
CONSTRUCTION													
SPC													
Engineering Consultant	6	8	15	20	20	10	3						82
Construction Contractors	4	8	20	28	31	8	5						104
B.C. Hydro - Site	2	4	8	9	9	7	2						41
- Vancouver	1	2	2	2	2	1	-						10
TOTAL SPC	13	22	45	59	62	26	10						237
OTEU													
Engineering Consultant	3	4	7	10	10	6	2						42
Construction Contractors	2	3	10	14	16	4	2						51
B.C. Hydro - Site	1	2	3	5	5	4	1						21
- Vancouver	2	2	2	3	3	2	-						14
TOTAL OTEU	8	11	22	32	34	16	5						128
BUILDING TRADES													
Construction Contractors	42	72	245	286	339	98	51						1133
TOTAL CONSTRUCTION	63	105	312	377	435	140	66						1498
DEVELOPMENT & OPERATIONS													
SPC													
Contractor			8	26	40	52	58	66	77	79	79	79	
B.C. Hydro			13	15	18	20	20	22	22	22	22	22	
TOTAL			21	41	58	72	78	88	99	101	101	101	
OFFICE & TECHNICAL													
Contractor			5	17	26	32	37	42	48	50	50	50	
B.C. Hydro			8	9	11	12	12	12	12	12	12	12	
TOTAL			13	26	37	44	49	54	60	62	62	62	
OPERATIONS UNION													
Contractor			-	75	129	246	337	382	417	507	607	607	
TOTAL DEVELOPMENT & OPERATIONS			34	142	224	362	464	524	576	670	770	770	
TOTAL MINING MANPOWER	81	121	346	519	659	502	530	524	576	670	770	770	

TABLE B.2-3

HAT CREEK PROJECT
2240 MW PLANT
OPERATIONS MANPOWER

OPERATING YEAR	-4	-3	-2	-1	1	2	3	4	5	6 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 36	37 to 38	39 to 40
HOURLY OPERATING:																		
TRUCK & SHOVEL OPERATORS			6	14	30	42	43	51	82	117	112	108	91	88	78	78	33	20
OTHER MAJOR EQUIPMENT OPERATORS			21	33	45	53	58	51	60	67	62	66	58	57	54	54	30	25
TRAINERS			4	4	6	6	6	6	6	6	6	6	6	6	6	5	3	-
DRAINAGE CREW			2	2	3	3	3	3	4	4	4	4	4	4	4	3	2	2
LIMESTONE QUARRY		-	-	1	2	4	4	4	6	8	8	8	8	8	8	7	4	3
TRUCK DUMP		-	-	-	10	16	16	16	16	16	16	16	16	16	16	16	11	11
COAL CRUSHING		-	-	-	3	3	4	7	7	7	7	7	7	7	7	6	4	4
STACKING & RECLAIMING		-	-	-	9	9	12	15	15	15	15	15	15	15	15	12	9	9
COAL CONVEYOR		-	-	-	2	2	3	5	5	5	5	5	5	5	5	4	3	3
HOUTH MEADOWS WASTE HANDLING		-	-	-		16	24	24	24	24	24	24	24	24	24	16	16	16
MEDICINE CREEK WASTE HANDLING		-	-	-	-	-	-	-	-	-	-	16	16	16	16	8	-	-
MISC. OTHER LABOUR (10%)			4	6	12	17	19	20	24	28	27	29	26	26	25	22	12	10
WAREHOUSE			7	10	10	14	14	14	14	14	14	14	14	14	14	11	7	7
TOTAL HOURLY OPERATING		0	44	70	132	185	206	216	263	311	300	318	290	286	272	242	134	110
HOURLY MAINTENANCE:																		
HEAVY EQUIPMENT MAINTENANCE AUTO SHOP			21	35	54	72	77	78	111	149	141	136	118	117	106	82	49	35
SERVICE CREW			2	3	4	5	5	5	8	10	10	9	8	8	15	12	7	6
BUILDING & YARD MAINTENANCE			4	5	8	11	11	11	13	13	13	13	13	13	13	10	7	7
COMMUNICATIONS			1	1	2	4	4	4	5	5	5	5	5	5	5	4	2	2
MISC. MAINTENANCE 10%			3	5	10	14	16	18	22	27	27	26	24	24	23	18	11	9
PLANT MAINTENANCE				10	36	46	63	85	85	92	101	100	94	95	93	69	47	44
TOTAL MAINTENANCE			31	59	114	152	176	201	244	296	297	289	262	262	255	195	123	103
STAFF:																		
MANAGEMENT		6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
ADMINISTRATION		17	20	25	28	28	30	30	30	30	30	30	30	30	30	23	16	16
ADMINISTRATION SERVICES		3	9	13	14	18	19	23	23	23	23	23	23	23	23	20	16	16
HUMAN RESOURCES		3	8	12	13	13	13	19	19	19	19	19	19	19	19	15	11	11
TRAINING			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
MINE ENGINEERING		1	7	11	11	13	15	16	16	16	16	16	16	16	16	12	8	8
MAINTENANCE SHOPS		2	7	14	23	28	33	34	34	34	34	34	34	34	34	27	20	20
MINE SUPERVISION		2	9	13	20	20	25	30	34	34	34	34	34	34	34	27	20	20
TOTAL STAFF		34	67	95	116	127	142	159	163	163	163	163	163	163	163	131	98	98
TOTAL MANPOWER		34	142	224	362	464	524	576	670	770	760	770	715	711	690	568	355	311

TABLE B.2-4

HAT CREEK PROJECT

2240 MW PLANT

MINE FIXED CAPITAL COST SUMMARY - (k$)

SITE AND IMPROVEMENTS		$ 69,400.6
MAINTENANCE, SERVICE AND ADMINISTRATION		34,349.0
MINING		4,500.2
CRUSHING AND CONVEYING		54,264.6
SECONDARY CRUSHING AND SCREENING		23,642.4
BLENDING AND DELIVERY		37,238.8
WASTE DISPOSAL		59,240.1
CONSTRUCTION INDIRECTS		48,878.7
MOBILE EQUIPMENT		217,618.5
CONTINGENCY - 10%		54,908.0
TOTAL		$604,040.9
OF WHICH:		
INITIAL CAPITAL (TO YEAR 7)	315,375.4	
CONTINGENCY 10%	31,537.5	
SUBTOTAL		$346,912.9
DEFERRED AND REPLACEMENT CAPITAL	233,752.7	
CONTINGENCY - 10%	23,375.3	
SUBTOTAL		$257,128.0
TOTAL		$604,040.9

TABLE B.2-5

2240 MW

TOTAL DIRECT MINE OPERATING COSTS

	TOTAL	PRE-PRODUCTION	PRODUCTION	UNIT	$/UNIT
MINE PRODUCTION:					
COAL	359,880	865	359,015	Kt	
WASTE	408,800	6,750	402,050	KBCM	
WASTE PARTINGS	35,978	77	35,901	KBCM	
WASTE RATIO	1.24	7.89	1.22		
OPERATING COSTS: $000's					
SITE:					
SITE AND PIT ROADS	106,671	2,392	104,279		
POWER	162,080	1,944	160,136		
	268,751	4,336	264,415	t	0.74
ADMINISTRATION AND ENGINEERING:					
MANAGEMENT	21,466	1,646	19,820		
ADMINISTRATION	138,965	9,241	129,724		
ADMINISTRATION SERVICES	46,739	2,108	44,631		
ADMINISTRATION SITE SVS.	33,242	935	32,307		
HUMAN RESOURCES	74,081	7,388	66,693		
TRAINING	32,463	1,484	30,979		
HOUSING ASSISTANCE	111,389	2,417	108,972		
MINE ENGINEERING	49,618	1,888	47,730		
CLOSE SPACED DRILLING	4,707	213	4,494		
	512,670	27,320	485,350	t	1.35
MAINTENANCE AND SERVICES:					
MAINTENANCE SHOPS	90,703	2,608	88,095		
ELECTRICAL MAINTENANCE	-	-	-		
MINE COMMUNICATIONS	10,421	139	10,282		
MINE TRANSPORTATION	21,881	507	21,374		
FIELD LUBRICATION/FUELING	5,689	157	5,532		
	128,694	3,411	125,283	t	0.35
MINING:					
MINE SUPERVISION	66,464	1,753	64,711		
GENERAL MINE COSTS	31,259	516	30,743		
AUXILIARY EQUIPMENT	76,437	5,519	70,918		
LOADING WASTE PARTINGS	9,954	22	9,932	BCM	.28
HAULING WASTE PARTINGS	24,723	54	24,669	BCM	.69
DRILLING WASTE	3,204	47	3,157		
BLASTING WASTE	9,707	141	9,566		
LOADING WASTE	83,773	1,385	82,388	BCM	.20
HAULING WASTE	237,710	3,475	234,235	BCM	.58
LOADING COAL	58,991	149	58,842	t	.16
HAULING COAL	126,820	323	126,497	t	.35
PIT DEWATERING & DRAINAGE	19,801	2,015	17,786		
LIMESTONE QUARRY	24,105	104	24,001		
	772,948	15,503	757,445	t	2.11
COAL HANDLING:					
CONVEYOR TO CRUSHER	29,169	297	28,872		
COAL CRUSHING	32,678	307	32,371		
LOW GRADE COAL	8,536	90	8,446		
STOCKPILING & BLENDING	67,069	671	66,398		
CONVEYING TO POWERPLANT	41,762	412	41,437		
	179,214	1,777	177,437	t	0.49
WASTE HANDLING:					
HANDLING IN PIT	60,589	-	60,589		
WASTE TO HOUTH MEADOWS	154,377	2,567	151,810		
WASTE TO MEDICINE CREEK	56,135	-	56,135		
	271,101	2,567	268,135	BCM	0.61
TOTAL OPERATING COSTS	2,133,378	54,914	2,078,464	t	5.79

TABLE B.2-6

HAT CREEK PROJECT
2240 MW PLANT
DIRECT OPERATING COSTS BY COST ELEMENT

	TOTAL ALL YEARS	PRE-PRO-DUCTION	PRODUC-TION	UNIT	$/UNIT
MINE PRODUCTION:					
COAL	359,880	865	359,015	Kt_3	
WASTE	408,800	6,750	402,050	Km_3^3	
WASTE PARTINGS	35,978	77	35,901	Km^3	
WASTE RATIO M^3/t	1.24	7.89	1.22	$m3/t$	
OPERATING COSTS: $000's					
WAGES AND BENEFITS	726,050	12,057	713,993	t	1.99
SALARIES AND BENEFITS	275,912	11,724	264,188	t	.74
DIESEL AND GASOLINE	168,077	3,858	164,219	t	.46
POWER	169,504	2,026	167,478	t	.47
SUPPLIES	52,408	1,542	50,866	t	.14
WEAR PARTS	24,084	764	23,320	t	.06
TIRES	74,208	1,207	73,001	t	.20
REPAIR PARTS	351,142	4,667	346,475	t	.97
MAINTENANCE ALLOCATION	(1)	(2)	1	t	.00
MOBILE EQUIPMENT	(14)	(2)	(12)	t	.00
OUTSIDE SERVICES	292,008	17,073	274,935	t	.77
TOTAL OPERATING COSTS	2,133,378	54,914	2,078,464	t	5.79

TABLE B.2-7

HAT CREEK PROJECT
2240 MW PLANT
MAINTENANCE LABOUR AND REPAIR COSTS FOR FIXED EQUIPMENT

	INITIAL CAPITAL COST $000's	PERCENT ANNUAL COST		TOTAL ANNUAL COST $000's
		MAINTENANCE LABOUR %	REPAIR PARTS %	
COAL HANDLING:				
COAL CONVEYOR TO CRUSHER	6,064	2.5	2.5	303.2
COAL CRUSHING	12,785	2.5	2.5	639.2
LOW GRADE COAL	11,937	1.0	1.0	238.8
COAL STOCKPILING & BLENDING:				
STACKER & RECLAIMER	14,749	1.5	1.5	442.5
TRANSPORT CAR	1,000	0.5	0.5	10.0
CONVEYORS	8,289	2.5	2.5	414.4
COAL CONVEYING TO POWERPLANT	18,867	2.5	2.5	943.4
TOTAL COAL HANDLING	73,691	2.03	2.03	2,991.5
WASTE SYSTEM:				
WASTE HANDLING IN PIT	23,343	2.5	2.5	1,167.2
WASTE HANDLING TO DUMPS	*56,767	2.3	2.3	*2,595.0
TOTAL WASTE HANDLING	80,110	2.35	2.35	3,762.2
TOTAL FIXED EQUIPMENT	153,801	2.2	2.2	6,753.7

*FIGURES FOR YEAR 7

TABLE B.2-8

HAT CREEK PROJECT
2240 MW PLANT
DIRECT OPERATING AND CAPITAL COST CASH FLOW
$000's

PRODUCTION YEAR	INITIAL FIXED CAPITAL	DEFERRED & REPLACEMENT CAPITAL	PRE-PRODUCTION CAPITAL	OPERATING COSTS	TOTAL CAPITAL AND OPERATING
-6	5,159				5,159
-5	36,839				36,839
-4	43,066				43,066
-3	31,092		3,069		34,161
-2	77,131		14,521		91,652
-1	41,024		21,480		62,504
1	33,830		15,844	15,825	65,499
2	15,456			38,006	53,462
3	14,353			42,303	56,656
4	4,386			44,539	48,925
5	29,235			53,957	83,192
6	11,953			58,857	70,810
7	3,389	11,387		62,027	76,803
8		4,282		62,755	67,037
9		31,114		62,136	93,250
10		4,871		63,383	68,254
11		13,589		60,907	74,496
12		5,271		64,395	69,666
13		10,597		64,395	74,992
14		5,123		64,975	70,098
15		13,139		62,336	75,475
16		23,482		60,856	84,338
17		13,332		60,918	74,250
18		2,587		60,303	62,890
19		6,245		60,539	66,784
20		8,987		58,825	67,812
21		17,379		56,302	73,681
22		6,130		56,302	62,432
23		4,085		56,907	60,992
24		4,477		56,417	60,894
25		19,645		56,494	76,139
26		2,606		55,787	58,393
27		6,159		55,274	61,433
28		2,291		55,206	57,497
29		8,032		55,159	63,191
30		2,911		54,856	57,767
31		4,331		53,124	57,455
32		5,642		53,124	58,766
33		800		53,024	53,824
34		2,519		52,948	55,467
35		1,106		50,087	51,193
36		167		35,125	35,292
37		402		27,784	28,186
38		423		26,718	27,141
39		162		24,972	25,134
40		13,859		20,619	34,478
TOTAL	346,913	257,128	54,914	2,078,464	2,737,419

TABLE B.2-9

HAT CREEK PROJECT
2240 MW PLANT
TOTAL COST OF COAL

	COST OF SERVICE STUDY OCT/81 $000's 1981	COST OF SERVICE STUDY JULY/82 $000's 1982	
INITIAL CAPITAL COSTS:			
CAPITAL COSTS TO FULL PRODUCTION	352,291	346,913	Quotes on equipment in 1982 U.S. Escalated $1979 1982 Costs end on Oct. 1 of Year +1.
PRE-PRODUCTION OPERATING COSTS	101,589	59,605	
DISCRETIONARY EXPENSES	19,490	3,000	
CONSTRUCTION INSURANCE AND BONDS	1,588	1,444	
LAND ACQUISITION	10,997	5,834	
OTHER ONGOING STUDIES	28,481	31,060	
MINE COST SYSTEM (COST CENTRE)	-	23,039	
CORPORATE OVERHEAD	51,523	11,772	
INTEREST DURING CONSTRUCTION	185,310	158,038	
PROJECT TOTAL COST	751,269	640,705	
PER TONNE	2.09	1.78	
REPLACEMENT CAPITAL	413,651	257,128	
PER TONNE	1.15	0.72	
OPERATING COSTS:			
DIRECT OPERATING	2,028,550	1,969,512	Re-estimated manpower.
CONTINGENCY - 10%	202,855	196,951	
CONTRACTOR'S ALLOWANCE	223,141	86,659	Redefined contractor scope.
SCHOOL TAXES	187,100	214,400	
PROVINCIAL COAL ROYALTY	158,954	114,000	Different basis.
INTEREST	308,850	263,397	
TOTAL OPERATING	3,109,450	2,844,919	
PER TONNE	8.64	7.91	
TOTAL COSTS	4,274,370	3,742,752	
PER TONNE	11.88	10.40	
TONNES PRODUCED (000's)	359,880	359,880	

B.3 1120 MW PLANT

B.3.1 Introduction

An 1120 MW project has been included in the assessment of alternatives since it represents the first two generating units of the 2240 project.

Mining costs have been determined by factoring from those of the 800 MW mine.

B.3.2 Scope

The coal required to feed an 1120 MW powerplant would amount to 180 Mt over the 36 year operating period, for an average production rate of about 5.1 Mt/a. The average waste ratio would be about 0.9:1.

The facilities required to mine and process the coal would be the same as those for the 800 MW mine, with proportionally higher capacity ratings. The H241 hydraulic shovel and the 91 t trucks would be used for both coal and waste, as in the 800 MW mine.

B.3.3 Capital Costs

Fixed capital costs for the 1120 MW mine were factored from the 800 MW capital estimate using arbitrary assessments of fixed and variable costs for each facility.

Initial direct fixed capital costs amount to $202 million, while deferred and replacement capital required after the second generating unit is in operation is $107.8 million.

B.3.4 Operating Costs

Operating costs during the preproduction and production periods were determined by factoring the 800 MW mine costs in proportion to the relative coal and waste quantities. Table B.3-2 shows a breakdown of operating costs.

Costs for mining and waste dumps have the same unit costs as those for the 800 MW mine because the same equipment is being employed and haul distances will be virtually the same. Administration, engineering and maintenance costs generally were factored in the same proportion as the mining costs.

Although the 1120 MW mine is expected to have a higher average waste ratio than the 800 MW mine (0.91 vs. 0.82), some of the operating costs do not increase in proportion to the coal quantity (e.g. Site and Pit Roads, Power, Coal Handling) and the total average unit operating cost during the production period is the same for both mines ($5.35/t).

TABLE B.3-1

HAT CREEK PROJECT
1120 MW PLANT
MINE FIXED CAPITAL COST SUMMARY

			(k$)
91000	Site and Improvements		43,267.4
92000	Maintenance, Service and Administration		26,440.3
93000	Mining		3,669.3
94000	Crushing and Screening		5,786.6
95000	Secondary Crushing and Screening		8,785.4
96000	Coal Blending and Delivery		30,857.7
97000	In 99000		-
98000	Construction Indirects		28,375.3
99000	Mobile Equipment		134,492.9
	Contingency		28,167.5
	TOTAL		$309,842.4
	Initial Capital (to Year 2)	183,640.9	
	Contingency (10%)	18,364.1	
	Subtotal		$202,005.0
	Deferred and Replacement Capital	98,034.0	
	Contingency (10%)	9,803.4	
	Subtotal		107,837.4
	TOTAL		$309,842.4

TABLE B.3-2

HAT CREEK PROJECT
1120 MW PLANT - TOTAL DIRECT MINE OPERATING COSTS - (k$)

	Total All Years	Pre-production	Pro-duction	Unit	$/Unit
Mine Production					
Coal	182,000	1,719	180,281	kt	
Waste	147,420	7,193	140,227	km^3	
Waste Partings	18,200	172	18,028	km^3	
Waste Ratio	0.91	4.28	0.88	m^3/t	
Operating Costs - (k$)					
Site:					
Site and Pit Roads	55,058	2,375	52,683		
Power	47,268	874	46,394		
	102,326	3,249	99,077	t	0.55
Administration and Engineering					
Management	19,609	1,646	17,963		
Administration	85,707	5,908	79,799		
Administration Services	23,355	1,754	21,601		
Administration Site Services	17,574	697	16,877		
Human Resources	38,829	3,398	35,431		
Training	20,841	841	20,000		
Housing Assistance	55,961	2,376	53,585		
Mine Engineering	27,386	1,319	26,067		
Close Spaced Drilling	2,799	211	2,588		
	292,061	18,150	273,911	t	1.52
Maintenance and Services					
Maintenance Shops	43,592	2,328	41,264		
Electrical Maintenance	481	11	470		
Mine Communications	3,746	33	3,713		
Mine Transportation	21,980	930	21,050		
Field Lubrication/Fueling	5,410	166	5,244		
	75,209	3,468	71,741	t	0.40
Mining					
Mine Supervision	30,478	1,553	28,925		
General Mine Costs	17,226	620	16,606		
Auxiliary Equipment	42,494	3,406	39,088		
Loading Waste Partings	3,822	36	3,786	m^3	0.21
Hauling Waste Partings	20,202	191	20,011	m^3	1.11
Drilling Waste	1,475	72	1,403	m^3	0.01
Blasting Waste	2,949	144	2,805	m^3	0.02
Loading Waste	33,906	1,654	32,252	m^3	0.23
Hauling Waste	140,049	6,833	133,216	m^3	0.95
Loading Coal	27,300	258	27,042	t	0.15
Hauling Coal	63,700	602	63,098	t	0.35
Pit Dewatering and Drainage	13,500	1,550	11,950		
Limestone Quarry	-	-	-		
	397,101	16,919	380,182	t	2.11
Coal Handling					
Conveying to Mine Mouth	20,571	135	20,436		
Crushing	19,092	157	18,935		
Stockpiling and Blending	46,930	492	46,438		
Conveying to Powerplant	24,971	198	24,773		
	111,564	982	110,582	t	0.61
Waste Dumps	31,468	2,237	29,231	t	0.18
TOTAL OPERATING	1,009,729	45,005	964,724	t	5.35

TABLE B.3-3

HAT CREEK PROJECT - 1120 MW PLANT
DIRECT MINE OPERATING AND CAPITAL COST CASH FLOW - (k$)

Production Year	Initial Fixed Capital	Deferred and Replacement Capital	Preproduction Capital	Operating Costs	Total Capital and Operating
-5	808				808
-4	15,029				15,029
-3	45,027		3,015		48,042
-2	84,357		12,385		96,742
-1	38,543		16,751		55,294
1	12,161		12,854	12,445	37,460
2	6 080	852		31,257	38,189
3		2,825		32,511	35,336
4		3,332		34,248	37,580
5		2,124		33,862	35,986
6		1,423		32,415	33,838
7		3,009		34,055	37 064
8		474		30,292	30,766
9		7,398		31,257	38,655
10		8,498		31,064	39,562
11		4,206		29,038	33,244
12		1,553		28,363	29,916
13		8,002		28,459	36,461
14		1,521		27,591	29,112
15		1,229		27,012	28,241
16		8,250		26,819	35,069
17		3,580		26,916	30,496
18		2,664		26,819	29,483
19		2,372		27,205	29,577
20		1,143		27,109	28,252
21		2,610		25,855	28,465
22		830		25,758	26,588
23		3,613		25,662	29,275
24		5,209		26,433	31,642
25		9,317		26,530	35,847
26		1,003		26,240	27,243
27		1,100		25,951	27,051
28		1,434		26,144	27,578
29		1,952		26,626	28,578
30		1,704		25,372	27,076
31		1,574		23,346	24,920
32		474		23,153	23,627
33		334		22,382	22,716
34		938		22,189	23,127
35		291		21,996	22,287
36		10,999		12,350	23,349
TOTAL	202,005	107,837	45,005	964,724	1,319,571

B.4 400 MW PLANT

B.4.1 Introduction

Hat Creek Project Management requested that a rough assessment of the probable costs of a 400 MW plant be prepared as an alternative. The powerplant would consist of a single 400 MW unit.

B.4.2 Scope

A single 400 MW powerplant would have a 35 year operating life commencing on 1 October 1992 (production year +1). The facilities required in the mine to feed this plant would be the same as those for the 800 MW plant, except the capacity ratings would be lowered where appropriate.

Coal and waste would be moved by H241 hydraulic shovels and 91 t trucks as in the 800 MW mine.

Total coal required to feed the 400 MW plant over its life is 66 Mt which will be mined from a pit having an overall average waste ratio of 0.70 BCM/t. This waste ratio is significantly less than that for the 800 MW mine because the pit might be restricted to an area west of the creekbed and thereby avoid mining the embankment east of the creek.

B.4.3 Capital Costs

Fixed capital costs for the 400 MW mine were estimated by factoring from the 800 MW estimate using assessed fixed and variable cost components for each facility.

Initial direct fixed capital amounts to $129 million in 1982 dollars while deferred and replacement fixed capital requirements after the start of commercial power production amount to $67 million.

B.4.4 Operating Costs

Operating costs during the preproduction and production periods were determined by factoring the 800 MW estimate in proportion to the relative coal and waste quantities. Table B.4-2 shows a breakdown of these costs.

Costs for mining and the waste dumps have the same unit costs as those for the 800 MW mine because the same equipment is being employed and haul distances are similar. Administration, engineering and maintenance were mostly factored in the same proportion as the mining costs.

Costs in certain cost centres will not be reduced in proportion to the reduced quantities because of the fixed nature of the activity (e.g. Site and Pit Roads, Power, Coal Handling). Therefore, despite the lower waste ratio for the 400 MW mine, the total mine operating costs during the production period amount to $6.42/t vs. $5.35/t for the 800 MW mine.

TABLE B.4-1

HAT CREEK PROJECT
400 MW PLANT
MINE FIXED CAPITAL COST SUMMARY

			(k$)
91000	Site and Improvements		$ 35,553.3
92000	Maintenance, Service and Administration		14,275.6
93000	Mining		1,449.5
94000	Crushing and Screening		4,049.9
95000	Secondary Crushing and Screening		5,653.8
96000	Coal Blending and Delivery		22,184.3
97000	In 99000		-
98000	Construction Indirects		17,446.9
99000	Mobile Equipment		
	Initial		24,354.2
	Replacement		52,884.5
	Contingency (10%)		17,785.2
	TOTAL		$195,637.2
	Initial Capital (to Year 1)	116,967.5	
	Contingency (10%)	11,696.7	
	Subtotal		$128,664.2
	Deferred Capital (Year 2-36)	60,884.5	
	Contingency (10%)	6,088.5	
	Subtotal		66,973.0
	TOTAL		$195,637.2

TABLE B.4-2

HAT CREEK PROJECT
400 MW PLANT - TOTAL MINE OPERATING COSTS - (k$)

	Total All Years	Preproduction	Production	Unit	$/Unit
Mine Production					
Coal	66,084	1,039	65,045	kt	
Waste	39,650	3,500	36,150	KBCM	
Waste Partings	6,608	104	6,504	KBCM	
Waste Ratio	0.70	3.47	0.66	BCM/t	
Operating Costs - (k$)					
Site:					
Site and Pit Roads	25,564	1,689	23,875		
Power	20,600	500	20,100		
	46,164	2,189	43,975	t	0.68
Administration and Engineering					
Management	13,138	1,103	12,035		
Administration	35,363	2,438	32,925		
Administration Services	14,513	782	13,731		
Administration Site Services	9,363	287	9,076		
Human Resources	27,243	1,999	25,244		
Training	8,025	289	7,736		
Housing Assistance	23,018	1,165	21,853		
Mine Engineering	15,999	699	15,300		
Close Spaced Drilling	1,348	102	1,246		
	148,010	8,864	139,146	t	2.14
Maintenance and Services					
Maintenance Shops	24,163	1,358	22,805		
Electrical Maintenance	254	6	248		
Mine Communications	1,288	22	1,266		
Mine Transportation	9,069	500	8,569		
Field Lubrication/Fueling	1,860	90	1,770		
	36,634	1,976	34,658	t	0.53
Mining					
Mine Supervision	11,682	441	11,241		
General Mine Costs	8,093	214	7,879		
Auxiliary Equipment	16,180	1,297	14,883		
Loading Waste Partings	1,388	22	1,366	BCM	0.21
Hauling Waste Partings	7,335	115	7,220	BCM	1.11
Drilling Waste	425	35	390	BCM	0.01
Blasting Waste	995	40	955	BCM	0.02
Loading Waste	9,120	805	8,315	BCM	0.23
Hauling Waste	37,668	3,325	34,343	BCM	0.95
Loading Coal	9,913	156	9,757	t	0.15
Hauling Coal	23,129	364	22,765	t	0.35
Pit Dewatering and Drainage	9,486	1,000	8,486		
Limestone Quarry	-	-	-		
	135,414	7,814	127,600	t	1.96
Coal Handling					
Conveying to Mine Mouth	11,127	144	10,983		
Crushing	10,359	132	10,227		
Stockpiling and Blending	25,948	414	25,534		
Conveying to Powerplant	13,093	167	12,926		
	60,527	857	59,670	t	0.92
Waste Dumps	13,415	1,045	12,370	BCM	0.29
TOTAL OPERATING	440,164	22,745	417,419	t	6.42

TABLE B.4-3

HAT CREEK PROJECT - 400 MW PLANT
DIRECT MINE OPERATING AND CAPITAL COST CASH FLOW - (k$)

Production Year	Initial Fixed Capital	Deferred and Replacement Capital	Preproduction Capital	Operating Costs	Total Capital and Operating
-5	515				515
-4	9,573				9,573
-3	28,679		1,524		30,203
-2	53,730		6,259		59,989
-1	24,549		8,466		33,015
1	7,746		6,496	10,686	24,928
2	3,872	529		13,524	17,925
3		1,755		14,067	15,822
4		2,069		14,818	16,887
5		1,319		14,651	15,970
6		884		14,025	14,909
7		1,869		14,735	16,604
8		295		13,107	13,402
9		4,594		13,524	18,118
10		5,277		13,441	18,718
11		2,612		12,564	15,176
12		964		12,272	13,236
13		4,969		12,314	17,283
14		944		11,938	12,882
15		763		11,688	12,451
16		5,123		11,604	16,727
17		2,224		11,646	13,870
18		1,654		11,604	13,258
19		1,473		11,771	13,244
20		710		11,729	12,439
21		1,621		11,187	12,808
22		516		11,145	11,661
23		2,244		11,103	13,347
24		3,235		11,437	14,672
25		5,786		11,479	17,265
26		623		11,354	11,977
27		683		11,229	11,912
28		891		11,312	12,203
29		1,212		11,521	12,733
30		1,058		10,978	12,036
31		978		10,102	11,080
32		295		10,018	10,313
33		208		9,684	9,892
34		583		9,601	10,184
35		7,012		9,561	16,573
TOTAL	128,664	66,973	22,745	417,419	635,801

B.5 COMPARISON OF PLANT ALTERNATIVES

B.5.1 Introduction

A comparison between the mine estimates for the four plant alternatives is presented in this section in order to summarize the general trends relating to the scale of mining activity.

B.5.2 Scope Comparison

Apart from differences in the amount of coal and waste being mined between the alternatives, there are no significant differences in mining methods between the 400, 800 and 1120 MW alternatives, but the 2240 MW mine utilizes different mobile equipment in the pit, handles waste material differently and processes low grade coal differently. These exceptions are summarized below.

Mining Methods and Equipment	400, 800 and 1120 MW Plants	2240 MW Plant
Waste Removal To Dump	91 t Trucks	Waste Conveyors and Stackers
Waste Dump Locations	Houth Meadows	Houth Meadows and Medicine Creek
Coal and Waste Shovels	14 m^3 and 18 m^3	11.5 m^3 and 14.5 m^3
Coal and Waste Trucks	91 t and 91 t	77 t and 154 t
Low Grade Coal Processing	No	Yes
Limestone Production	No	Yes

The production of limestone in the 2240 MW plant alternative is to supply the flue gas desulphurization process in the powerplant, but its production cost has been included in mine operating costs.

The major difference in mining scope between the four plant alternatives is the difference in waste ratios. Table B.5-1 shows the total coal required and the average waste ratio for a range of hypothetical plant capacities based upon the engineered mine plans for the 800 MW plant and the 2240 MW plant.

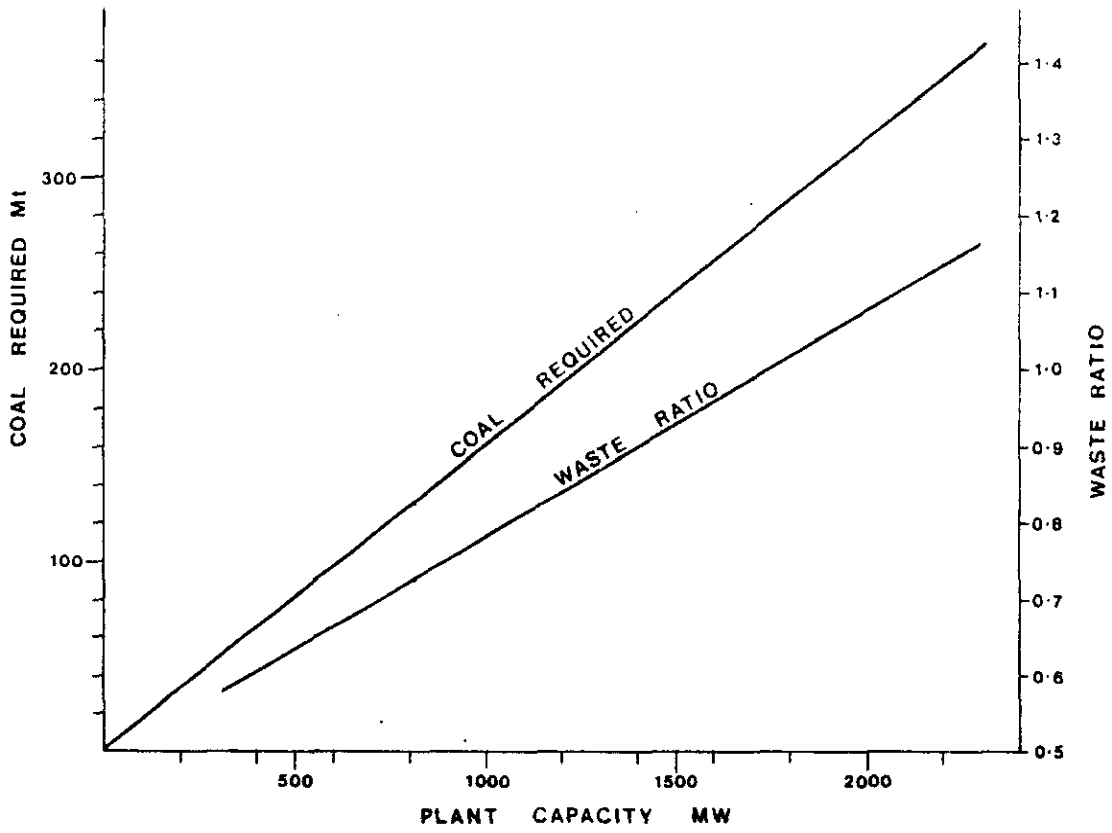
B.5.3 Cost Comparison

Initial, deferred and replacement fixed capital costs are compared in Table B.5-2 for each of the plant alternatives. Initial fixed capital costs range from $1.98/t produced over the 35 year production period for the 400 MW case to a low of $0.96 for the 2240 MW case.

The average operating costs for the four plant alternatives are shown in Table B.5-3. The lowest operating costs are apparently achieved for the 800 MW and 1120 MW alternatives. The higher waste ratio and the different waste handling system for the 2240 alternative and the diseconomies of scale for the 400 MW alternative make these more costly.

TABLE B.5-1

HAT CREEK PROJECT
COAL AND WASTE QUANTITIES FOR PLANT ALTERNATIVES



Plant Size MW	Coal Required kt	Waste Partings km^3	Waste*1 Ratio m^3/t	Waste*1 km^3
Engineering Data:				
2240	359,880	35,978	1.14	408,800
800	132,168	13,159	0.72	95,335
Extrapolated Data:				
1120	182,000	18,200	0.81	147,420
400	66,084	6,600	0.60	39,650

*1 Excluding Waste Partings

TABLE B.5-2

HAT CREEK PROJECT
FIXED MINE CAPITAL COST COMPARISON FOR PROJECT ALTERNATIVES

		400 MW Plant	800 MW Plant	1120 MW Plant	2240 MW Plant
Mine Production					
Coal	kt	65,045	130,940	180,281	359,015
Waste	KBCM	36,150	90,197	140,227	402,050
Waste Partings	KBCM	6,504	13,096	18,028	35,901
Waste Ratio	BCM/t	0.66	0.79	0.88	1.22
Initial Fixed Capital - (k$)					
Site and Improvements		27,553.3	30,066.2	34,517.4	40,363.0
Maintenance, Service and Admin.		14,275.6	22,907.4	26,440.3	34,349.0
Mining		1,449.5	2,427.5	3,669.3	4,141.1
Crushing and Conveying		4,049.9	5,564.0	5,786.6	22,619.1*1
Secondary Crushing		5,653.8	8,447.5	8,785.4	23,642.4
Blending and Delivery		22,184.3	28,571.9	30,857.7	37,238.8
Waste Disposal		-	-	-	38,369.5*1
Construction Indirects		17,446.9	26,273.4	28,375.3	48,878.7
Mobile Equipment		24,354.2	35,319.7	45,209.2	62,692.8
Contingency		11,696.7	16,027.7	18,364.1	31,229.4
TOTAL		128,664.2	175,605.3	202,005.3	343,523.8
Per Tonne		1.98	1.34	1.12	0.96
Deferred and Replacement Capital - (k$)					
Site and Improvements		8,000.0	8,565.8	8,750.0	29,037.6
Maintenance, Service and Admin.		-	700.0	-	-
Mining		-	970.0	-	358.9
Crushing and Conveying		-	-	-	31,645.5*1
Secondary Crushing		-	-	-	-
Blending and Delivery		-	-	-	-
Waste Disposal		-	-	-	20,870.6*1
Construction Indirects		-	-	-	-
Mobile Equipment		52,884.5	69,752.9	89,283.7	154,925.7
Contingency		6,088.5	7,928.6	9,803.4	23,678.6
TOTAL		66,973.0	87,917.3	107,837.1	260,516.9
Per Tonne		1.03	0.67	0.60	0.73

*1 Based upon this cost comparison it would appear that savings could be realized by utilizing trucks to haul waste to the dumps. To quantify these savings a detailed replanning of the waste handling system is required which is beyond the scope of this study.

TABLE B.5-3

HAT CREEK PROJECT
COMPARISON OF AVERAGE MINE OPERATING COSTS DURING THE PRODUCTION PERIOD

		400 MW Plant	800 MW Plant	1120 MW Plant	2240 MW Plant
Mine Production					
Coal	kt	65,045	130,940	180,281	359,015
Waste	KBCM	36,150	90,197	140,227	402,050
Waste Partings	KBCM	6,504	13,096	18,028	35,901
Waste Ratio	BCM/t	0.66	0.79	0.88	1.22
Operating Costs - $/t					
Site Costs		0.68	0.60	0.55	0.74
Administration and Engineering		2.14	1.48	1.52	1.35
Maintenance and Services		0.53	0.38	0.40	0.35
Mining		1.96	2.00	2.11	2.11
Coal Handling		0.92	0.71	0.61	0.49
Waste Handling		0.19	0.18	0.16	0.75*1
TOTAL OPERATING COSTS		6.42	5.35	5.35	5.79

*1 Based upon this cost comparison it would appear that savings could be realized by utilizing trucks to haul waste to the dumps. To quantify these savings, a detailed replanning of the waste handling system is required which is beyond the scope of this study.

TABLE B.5-4

HAT CREEK PROJECT
TOTAL COST OF COAL COMPARISON FOR 800 AND 2240 MW - (1982 k$)

	800 MW Plant	2240 MW Plant
Initial Capital Costs		
Capital Costs to Full Production	175,605	346,913
Pre-production Operating Costs	36,363	60,405
Discretionary Expenses	3,000	3,000
Construction Insurance and Bonds	749	1,444
Land Aquisition	5,414	5,834
Other Ongoing Studies	27,414	31,060
Mine Cost System	22,237	23,039
Corporate Overhead	6,787	11,772
Interest During Construction	43,198	61,076
Project Total Cost	320,767	544,543
Per Tonne	2.45	1.52
Deferred and Replacement Capital	87,917	257,128
Per Tonne	0.67	0.72
Operating Costs		
Direct Operating	701,195	2,078,464
Contingency	70,120	207,846
Contractor's Allowance	30,853	91,452
School Taxes	80,000	197,000
Provincial Coal Royalty	50,000	126,000
Interest and Insurance	169,000	325,000
Total Costs	1,101,168	3,025,762
Per Tonne	8.41	8.44
Total Cost of Coal	1,509,852	3,827,433
Per Tonne	11.53	10.68

Note: The total cost of coal presented in this table is undiscounted in October 1982 dollars. B.C. Hydro's cost of service computer program yields a levelized cost of coal by discounting costs of service and coal production quantities by the interest rate, which yields $12.10/t for the 800 MW case and $10.70/t for 2240 MW.