

REVISED
BC HYDRO UNDERTAKING

BC HYDRO REVENUE REQUIREMENT HEARING
2004/05 AND 2005/06

HEARING DATE

June 8, 2004

TRANSCRIPT REFERENCE

Volume 19, Page 3297-3298

REQUESTOR: IPPBC

QUESTION

For Peace Site C, Mica 5, and Revelstoke 5, provide the information that was used in the IEP assessment, by providing a breakdown of the cash flow year by year of the capital cost and operating cost.

REVISED RESPONSE:

The purpose of this revision is to correct the titles and units of measure in Tables 4 to 6.

The attached Tables 1 to 3 show a breakdown of the major capital cost elements for Site C, Mica 5 and Revelstoke 5, respectively. These capital costs are shown in the 2004 IEP Part 3 Appendix F. Unit costs are provided using a 6 percent real discount rate and based on the economic life of the projects. The use of a higher discount rate or shorter amortization period would increase the unit cost. Table 4 provides a year by year cash flow of costs for Site C. Table 4 includes grants-in-lieu and water rental capacity charges that were inadvertently excluded in the IEP portfolio analysis.

Table 5 provides a year by year cash flow of the costs for Mica 5. Table 5 includes water rental capacity charges that were inadvertently excluded in the IEP portfolio analysis. However, Table 5 does not include any water rental charges or credits for the additional 50 GWh/yr gained at Mica.

Table 6 provides a year by year cash flow of the costs for Revelstoke 5. Table 6 includes water rental capacity charges that were inadvertently excluded in the IEP portfolio analysis. However, Table 6 does not include any water rental charges or credits for the additional 60 GWh/yr gained at Revelstoke.

TABLE 1

Project Name	Site C
	2003\$ millions
Lands & Rights and Reservoir Cost	122.2
Site Access & Clearing	28.6
Excavation, Cofferdams and Diversion Tunnels	232.0
Earthfill Dam	204.0
Spillway & Approach Channels	275.3
Power Intakes & Penstocks	171.5
Power House - Civil	158.8
Power House - Mechanical	127.1
Power House - Electrical	133.4
Switchgear Bldg (Electrical & Mechanical Include)	56.6
Construction Services	50.2
Direct Construction Cost	1559.8
Management & Engineering	223.8
Regulatory, First Nation and Mit & Comp	62.3
Construction Insurance	7.7
Contingency	215.4
Indirect Construction Cost	509.2
Total Generation Station	2069.0
Stations and Transmission (Site C to Peace Canyon)	69.0
Total Construction Cost	2138.0

Notes:

- Capital costs do not include corporate overhead and IDC

TABLE 2**Project Name Mica 5**

2003\$ millions

Powerhouse Civil	10.4
Powerhouse Mechanical	20.9
Powerhouse Electrical	62.5
Construction Services	1.8
<hr/>	
Direct Construction Cost	95.8
<hr/>	
Contingencies	9.8
Mitigation & Compensation	1.3
Management and Engineering	12.3
Construction Insurance and Bonds	1.0
<hr/>	
Indirect Construction Cost	24.5
<hr/>	
Total Construction Cost	120.3
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Notes:

- Source: Mar 2003 capital cost estimate
- Capital cost in 2002\$ were escalated to 2003\$ using Statistics Canada Inflation Rate (2003\$=118.1/115.3*2002\$)
- Capital costs do not include corporate overhead and IDC

TABLE 3**Project Name Rev 5**

2003\$ millions

General	0.6
Penstock	4.5
Powerhouse Civil	7.8
Powerhouse Mechanical	28.7
Powerhouse Electrical	36.8
Construction Services	2.6
<hr/> Direct Construction Cost	<hr/> 81.0
Contingencies	6.1
Mitigation & Compensation	1.7
Management and Engineering	16.1
Construction Insurance and Bonds	0.4
<hr/> Indirect Construction Cost	<hr/> 24.4
<hr/> Total Construction Cost	<hr/> 105.4

Notes:

- Source: Mar 2003 capital cost estimate
- Capital cost in 2002\$ were escalated to 2003\$ using Statistics Canada Inflation Rate (2003\$=118.1/115.3*2002\$)
- Capital costs do not include corporate overhead and IDC

TABLE 4 AT SITE UNIT ENERGY COST

c

Project Name	Site C	
Capacity	900	MW
Average Energy	4780	GWh
Water Rentals (energy)	4.835	\$/MWh
Water Rentals (capacity)	3.453	\$/kW
Discount Rate	6%	

Year	Energy (GWh/yr)	Capital (\$k)	O&M (\$k)	Taxes and Grants-In-Lieu (\$k)	Water Rentals		Total Costs (\$k)
					Energy (\$k)	Capacity (\$k)	
-9	-	5,986	-	-	-	-	5,986
-8	-	28,863	-	-	-	-	28,863
-7	-	236,249	-	-	-	-	236,249
-6	-	421,186	-	-	-	-	421,186
-5	-	418,193	-	-	-	-	418,193
-4	-	450,904	-	-	-	-	450,904
-3	-	320,914	-	-	-	-	320,914
-2	-	152,653	-	-	-	-	152,653
-1	-	90,865	-	-	-	-	90,865
0	4,780	11,973	11,100	482	23,111	3,108	49,773
1	4,780	-	11,100	482	23,111	3,108	37,801
2	4,780	-	11,100	482	23,111	3,108	37,801
3	4,780	-	11,100	482	23,111	3,108	37,801
4	4,780	-	11,100	482	23,111	3,108	37,801
5	4,780	-	11,100	482	23,111	3,108	37,801
6	4,780	-	11,100	482	23,111	3,108	37,801
7	4,780	-	11,100	482	23,111	3,108	37,801
8	4,780	-	11,100	482	23,111	3,108	37,801
9	4,780	-	11,100	482	23,111	3,108	37,801
10	4,780	-	11,100	482	23,111	3,108	37,801
11	4,780	-	11,100	482	23,111	3,108	37,801
12	4,780	-	11,100	482	23,111	3,108	37,801
13	4,780	-	11,100	482	23,111	3,108	37,801
14	4,780	-	11,100	482	23,111	3,108	37,801
15	4,780	-	11,100	482	23,111	3,108	37,801
16	4,780	-	11,100	482	23,111	3,108	37,801
17	4,780	-	11,100	482	23,111	3,108	37,801
18	4,780	-	11,100	482	23,111	3,108	37,801
19	4,780	-	11,100	482	23,111	3,108	37,801
20	4,780	-	11,100	482	23,111	3,108	37,801
21	4,780	-	11,100	482	23,111	3,108	37,801
22	4,780	-	11,100	482	23,111	3,108	37,801
23	4,780	-	11,100	482	23,111	3,108	37,801
24	4,780	-	11,100	482	23,111	3,108	37,801
25	4,780	-	11,100	482	23,111	3,108	37,801
26	4,780	-	11,100	482	23,111	3,108	37,801
27	4,780	-	11,100	482	23,111	3,108	37,801
28	4,780	-	11,100	482	23,111	3,108	37,801
29	4,780	-	11,100	482	23,111	3,108	37,801
30	4,780	-	11,100	482	23,111	3,108	37,801
31	4,780	-	11,100	482	23,111	3,108	37,801
32	4,780	-	11,100	482	23,111	3,108	37,801
33	4,780	-	11,100	482	23,111	3,108	37,801
34	4,780	-	11,100	482	23,111	3,108	37,801
35	4,780	-	11,100	482	23,111	3,108	37,801
36	4,780	-	11,100	482	23,111	3,108	37,801
37	4,780	-	11,100	482	23,111	3,108	37,801
38	4,780	-	11,100	482	23,111	3,108	37,801
39	4,780	-	11,100	482	23,111	3,108	37,801
40	4,780	-	11,100	482	23,111	3,108	37,801
41	4,780	-	11,100	482	23,111	3,108	37,801
42	4,780	-	11,100	482	23,111	3,108	37,801
43	4,780	-	11,100	482	23,111	3,108	37,801
44	4,780	-	11,100	482	23,111	3,108	37,801
45	4,780	-	11,100	482	23,111	3,108	37,801
46	4,780	-	11,100	482	23,111	3,108	37,801
47	4,780	-	11,100	482	23,111	3,108	37,801
48	4,780	-	11,100	482	23,111	3,108	37,801
49	4,780	-	11,100	482	23,111	3,108	37,801
50	4,780	-	11,100	482	23,111	3,108	37,801
51	4,780	-	11,100	482	23,111	3,108	37,801
52	4,780	-	11,100	482	23,111	3,108	37,801
53	4,780	-	11,100	482	23,111	3,108	37,801
54	4,780	-	11,100	482	23,111	3,108	37,801
55	4,780	-	11,100	482	23,111	3,108	37,801
56	4,780	-	11,100	482	23,111	3,108	37,801
57	4,780	-	11,100	482	23,111	3,108	37,801
58	4,780	-	11,100	482	23,111	3,108	37,801
59	4,780	-	11,100	482	23,111	3,108	37,801
60	4,780	-	11,100	482	23,111	3,108	37,801
61	4,780	-	11,100	482	23,111	3,108	37,801
62	4,780	-	11,100	482	23,111	3,108	37,801
63	4,780	-	11,100	482	23,111	3,108	37,801
64	4,780	-	11,100	482	23,111	3,108	37,801
65	4,780	-	11,100	482	23,111	3,108	37,801
66	4,780	-	11,100	482	23,111	3,108	37,801
67	4,780	-	11,100	482	23,111	3,108	37,801
68	4,780	-	11,100	482	23,111	3,108	37,801
69	4,780	-	11,100	482	23,111	3,108	37,801

Project Life: 70 years
NPV: 46,356

1,929,941
42 \$/MWh

c

Project Life: 20 years
NPV: 32,452

1,819,981
56 \$/MWh

n

- Notes:
- Costs are \$2003
 - Capital costs do not include corporate overhead
 - IDC is accounted for in discounting of cash flows

TABLE 5 AT SITE UNIT COST OF CAPACITY

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Project Name Mica 5
 Dependable Capacity 400 MW
 Rated Capacity 450 MW
 Water Rentals (capacity) 3.453 \$/kW
 Discount Rate 6%

Year	Dependable Capacity (MW)	Capital (\$k)	O&M (\$k)	Taxes and Grants-In-Lieu (\$k)	Water Rentals Capacity (\$k)	Total Costs (\$k)
-5	-	1,263	-	-	-	1,263
-4	-	10,726	-	-	-	10,726
-3	-	22,150	-	-	-	22,150
-2	-	56,542	-	-	-	56,542
-1	-	29,233	-	-	-	29,233
0	400	337	906	241	1,554	3,038
1	400	-	906	241	1,554	2,701
2	400	-	906	241	1,554	2,701
3	400	-	906	241	1,554	2,701
4	400	-	906	241	1,554	2,701
5	400	-	906	241	1,554	2,701
6	400	-	906	241	1,554	2,701
7	400	-	906	241	1,554	2,701
8	400	-	906	241	1,554	2,701
9	400	-	906	241	1,554	2,701
10	400	-	906	241	1,554	2,701
11	400	-	906	241	1,554	2,701
12	400	-	906	241	1,554	2,701
13	400	-	906	241	1,554	2,701
14	400	-	906	241	1,554	2,701
15	400	-	906	241	1,554	2,701
16	400	-	906	241	1,554	2,701
17	400	-	906	241	1,554	2,701
18	400	-	906	241	1,554	2,701
19	400	-	906	241	1,554	2,701
20	400	-	906	241	1,554	2,701
21	400	-	906	241	1,554	2,701
22	400	-	906	241	1,554	2,701
23	400	-	906	241	1,554	2,701
24	400	-	906	241	1,554	2,701
25	400	-	906	241	1,554	2,701
26	400	-	906	241	1,554	2,701
27	400	-	906	241	1,554	2,701
28	400	-	906	241	1,554	2,701
29	400	-	906	241	1,554	2,701
30	400	-	906	241	1,554	2,701
31	400	-	906	241	1,554	2,701
32	400	-	906	241	1,554	2,701
33	400	-	906	241	1,554	2,701
34	400	-	906	241	1,554	2,701
35	400	-	906	241	1,554	2,701
36	400	-	906	241	1,554	2,701
37	400	-	906	241	1,554	2,701
38	400	-	906	241	1,554	2,701
39	400	-	906	241	1,554	2,701
40	400	-	906	241	1,554	2,701
41	400	-	906	241	1,554	2,701
42	400	-	906	241	1,554	2,701
43	400	-	906	241	1,554	2,701
44	400	-	906	241	1,554	2,701
45	400	-	906	241	1,554	2,701
46	400	-	906	241	1,554	2,701
47	400	-	906	241	1,554	2,701
48	400	-	906	241	1,554	2,701
49	400	-	906	241	1,554	2,701

Project Life: 50 years
 NPV: 4,711

128,012
27 \$/kW-yr

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- Notes:
- Costs are \$2003
 - Capital costs do not include corporate overhead
 - IDC is accounted for in discounting of cash flows
 - No water rental charges or credits for additional 50 GWh/yr at Mica is included
 - Taxes and Grant-in-Lieu and Water Rentals are based on Rated Capacity

TABLE 6 AT SITE UNIT COST OF CAPACITY

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Project Name **Rev 5**
 Dependable Capacity 480 MW
 Rated Capacity 500 MW
 Water Rentals (capacity) 3.453 \$/kW
 Discount Rate 6%

Year	Dependable Capacity (MW)	Capital (\$k)	O&M (\$k)	Taxes and Grants-In-Lieu (\$k)	Water Rentals Capacity (\$k)	Total Costs (\$k)
-4	-	9,802	-	-	-	9,802
-3	-	30,566	-	-	-	30,566
-2	-	52,700	-	-	-	52,700
-1	-	12,332	-	-	-	12,332
0	480	-	692	268	1,727	2,686
1	480	-	692	268	1,727	2,686
2	480	-	692	268	1,727	2,686
3	480	-	692	268	1,727	2,686
4	480	-	692	268	1,727	2,686
5	480	-	692	268	1,727	2,686
6	480	-	692	268	1,727	2,686
7	480	-	692	268	1,727	2,686
8	480	-	692	268	1,727	2,686
9	480	-	692	268	1,727	2,686
10	480	-	692	268	1,727	2,686
11	480	-	692	268	1,727	2,686
12	480	-	692	268	1,727	2,686
13	480	-	692	268	1,727	2,686
14	480	-	692	268	1,727	2,686
15	480	-	692	268	1,727	2,686
16	480	-	692	268	1,727	2,686
17	480	-	692	268	1,727	2,686
18	480	-	692	268	1,727	2,686
19	480	-	692	268	1,727	2,686
20	480	-	692	268	1,727	2,686
21	480	-	692	268	1,727	2,686
22	480	-	692	268	1,727	2,686
23	480	-	692	268	1,727	2,686
24	480	-	692	268	1,727	2,686
25	480	-	692	268	1,727	2,686
26	480	-	692	268	1,727	2,686
27	480	-	692	268	1,727	2,686
28	480	-	692	268	1,727	2,686
29	480	-	692	268	1,727	2,686
30	480	-	692	268	1,727	2,686
31	480	-	692	268	1,727	2,686
32	480	-	692	268	1,727	2,686
33	480	-	692	268	1,727	2,686
34	480	-	692	268	1,727	2,686
35	480	-	692	268	1,727	2,686
36	480	-	692	268	1,727	2,686
37	480	-	692	268	1,727	2,686
38	480	-	692	268	1,727	2,686
39	480	-	692	268	1,727	2,686
40	480	-	692	268	1,727	2,686
41	480	-	692	268	1,727	2,686
42	480	-	692	268	1,727	2,686
43	480	-	692	268	1,727	2,686
44	480	-	692	268	1,727	2,686
45	480	-	692	268	1,727	2,686
46	480	-	692	268	1,727	2,686
47	480	-	692	268	1,727	2,686
48	480	-	692	268	1,727	2,686
49	480	-	692	268	1,727	2,686

Project Life: 50 years
 NPV: 5,993

124,001
21 \$/kW-yr

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- Notes:
- Costs are \$2003
 - Capital costs do not include corporate overhead
 - IDC is accounted for in discounting of cash flows
 - No water rental charges or credits for additional 60 GWh/yr at Revelstoke is included
 - Taxes and Grant-in-Lieu and Water Rentals are based on Rated Capacity