#92

Docket No. 5491
Exhibit CLF-PLC-1

STATE OF VERMONT
PUBLIC SERVICE BOARD

DIRECT TESTIMONY OF

PAUL CHERNICK
Resource Insight, Inc.

ON BEHALF OF THE

CONSERVATION LAW FOUNDATION

July 19, 1991

TABLE OF CONTENTS

1. INTRODUCTION AND QUALIFICATIONS

Q: Mr. Chernick, please state your name, occupation, and business address.

A: My name is Paul L. Chernick. I am President of Resource Insight, Inc., 18 Tremont Street, Suite 1000, Boston, Massachusetts.

Q: Mr. Chernick, would you please briefly summarize your professional education and experience?

A: I received an S.B. degree from the Massachusetts Institute of Technology in June, 1974 from the Civil Engineering Department, and an S.M. degree from the Massachusetts Institute of Technology in February, 1978 in Technology and Policy. I have been elected to membership in the civil engineering honorary society Chi Epsilon and the engineering honor society Tau Beta Pi, and to associate membership in the research honorary society Sigma Xi.

I was a Utility Analyst for the Massachusetts Attorney General for over three years and was involved in numerous aspects of utility rate design, costing, load forecasting, and the evaluation of power supply options.

As a Research Associate at Analysis and Inference and in my current position, I have advised a variety of clients on utility matters. My work has considered, among other things, the need for, cost of, and cost-effectiveness of prospective new generation plants and transmission lines; retrospective review of generation planning decisions; ratemaking for plant under construction; ratemaking for excess and/or uneconomical plant entering service; conservation program design; cost recovery for utility efficiency programs; and the valuation of environmental externalities from energy production and use. My resume is attached to this testimony as Attachment 1.

Q: Mr. Chernick, have you testified previously in utility proceedings?

A: Yes. I have testified approximately eighty times on utility issues before various regulatory, legislative, and judicial bodies, including the Massachusetts Department of Public Utilities, the Massachusetts Energy Facilities Siting Council, the Maine Public Utilities Commission, the Texas Public Utilities Commission, the New Mexico Public Service Commission, the District of Columbia Public Service Commission, the New Hampshire Public Utilities Commission, the Connecticut Department of Public Utility Control, the Michigan Public Service Commission, the Illinois Commerce Commission, the Minnesota Public Utilities Commission, the Federal Energy Regulatory Commission, and the Atomic Safety and Licensing Board of the U.S. Nuclear Regulatory Commission. A detailed list of my previous testimony is contained in my resume. Subjects on which I have testified include nuclear power plant construction costs and schedules, nuclear power plant operating costs, power plant phase-in procedures, the funding of nuclear decommissioning, cost allocation, rate design, long range energy and demand forecasts, utility supply planning decisions, conservation costs and potential effectiveness, generation system reliability, fuel efficiency standards, and ratemaking for utility production investments and conservation programs.

Q: Have you testified previously before this Commission?

A: Yes. I testified in Docket 4936, on the costs and in-service date of Millstone 3, on behalf of the Vermont DPS; in Docket 5270, on least-cost planning and demand-side management, once on behalf of the Conservation Law Foundation (CLF) and once on behalf of other parties involved in the collaborative; and in Docket 5330, on approval of Vermont utilities' contract with Hydro-Quebec, on behalf of the Conservation Law Foundation and other groups.

Q: What other experience have you had with Central Vermont Public Service?

A: I was the lead consultant on policy and resource allocation issues for the Central Vermont (CV) DSM collaborative.

Q: Have you authored any publications on utility planning and ratemaking issues?

A: Yes. I have authored a number of publications on rate design, cost allocations, power plant cost recovery, conservation program design and cost-benefit analysis, and other ratemaking issues. These publications are listed in my resume.

2. PURPOSE OF TESTIMONY

Q: What is the purpose of this testimony?

A: The purpose of this testimony is to review the cost-effectiveness of CV's current commitment to Hydro Quebec (HQ) purchases and the effect of that commitment on the development of cost-effective DSM.

3. HISTORICAL BACKGROUND

Q: Has this issue arisen before the Board in a previous docket?

A: Yes. In my testimony in Docket 5330, I discussed the possibility that the Vermont Joint Owners (VJO) HQ purchases would displace less expensive DSM resources.

The VJO presented surrebuttal testimony of Bruce Bentley and Thomas Boucher (February 16, 1990) in response to my analysis. Mr. Boucher testified:

> From the early 1970's, GMP and other Vermont utilities have sold capacity and associated energy to other New England utilities from base-load sources, such as Vermont Yankee, at the full cost of service . . . GMP consummated these transactions during a period of excess generating capacity in the New England area. We see a much stronger market available in the 1990's . . .
>
> GMP . . . is confident of its ability to sell any excess energy and capacity at full cost. (Boucher surrebuttal, pp. 4-5)

Mr. Bentley testified:

> Central Vermont's extensive experience in off-system sales demonstrates that such sales are made at least at the full cost of full capacity <u>and</u> energy. Ratemaking throughout the years in Vermont recognizes that fact. There is no reason to believe that trend will not continue in the future. To the contrary, the market for sellers in the Northeast should improve. (Bentley surrebuttal, p. 4)

The Board determined in its November 1990 order in Docket 5330 that, for the load forecasts considered in the proceeding, the HQ purchase at its 340 MW minimum level would not substantially reduce the avoided cost for DSM as long as no more than a 30% reduction in loads was feasible. This determination was based in part on the assumption that excess power could be resold at a substantial profit. The Board recognized that this conclusion could be reversed if:

- potential DSM levels are higher than those identified by the DPS,
- fuel prices are lower than anticipated, and
- "the resale price for excess contract power declines below its purchase cost." (PSB 5330, p. 117)

The Board also found that "whether the Contract would preclude DSM costing less than Contract power turns on whether approximately 12 percent of Contact power can be resold without loss." (ibid, p. 119)

4. EVENTS SINCE DOCKET 5330

Q: Has the situation changed since the Board order in Docket 5330?

A: Yes. Load forecasts in Vermont and throughout the region have fallen because of the current recession and utility DSM programs. Clearly, the resale market and load conditions anticipated by the Board in Docket 5330 have changed.

Q: Do we have any new analyses from CV pertinent to the effect of the HQ purchase on DSM?

A: Yes, we have several such sources. One source is Mr. Bentley's testimony in NHPUC Docket DE90-053, dated March 18, 1991, on behalf of the 1991 least-cost integrated plan (LCIP) of CV's subsidiary Connecticut Valley Electric Company (CVEC). His testimony makes the following points:

- The need for additional resources moved from 1993 in the June 1990 LCIP to 2001 in the 1991 LCIP.[1]

- Removing the Sheldon Springs cogenerator from the resource plan would only move the need for additional resources up to 1998 or 1999.

- Committed DSM was assumed to produce a capability responsibility reduction of over 100 MW by 2010 in the 1990 LCIP, but by only about 50 MW in the 1991 LCIP.

- Avoided costs "used for DSM screening" in the 1991 LCIP were shown to be lower, at least through 1998, than the avoided costs apparently used for QFs in the 1990 LCIP.

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[1]It does not appear that the "committed DSM" in this analysis, or in any of the CV analyses discussed in this testimony, would include the effects of the fuel-switching programs CV is to undertake, or of more aggressive programs the Board may order if the CV experiment fails to capture the cost-effective fuel-switching potential. Hence, the need for additional resources would come even later, and the avoided costs will be lower, once fuel-switching effects are incorporated in the projections.

For example, at 75% load factor, the 1997 projection fell about 20%, from 8.36¢/kWh to 6.76¢/kWh. It appears that the 1991 avoided costs included reserve requirements and a DSM load shape.[2] The apparent decrease in avoided costs from 1990 to 1991 is thus understated. The 1990 avoided costs restated to be consistent with the 1991 projections would be about 20% higher, and the decrease in avoided costs for 1997 would be roughly 33%.

- As a short-term response to the changed load and supply relationship, "CVPS will reassess the schedules for DSM implementation to maximize the societal benefits." The clear implication is that cost-effective DSM will be deferred until avoided costs rise.

The testimony before the NHPUC does not offer to pursue any of the full-cost sales of HQ power which CV asserted in Docket 5330 would be feasible, and on which the Board relied in approving the 340 MW purchase.

Q: What is the second source of new information on the effect of the HQ purchase on CV's avoided costs and DSM prospects?

A: CV has provided some relevant information in its filing in this docket.

- CV projects that it will not be able to resell its contract for power from Ontario Hydro (OH) at full cost.

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[2]DSM avoided costs should be considerably higher than QF avoided costs. For example:

- Avoided energy costs from DSM are higher than those from QFs, even at the generator level, because of the difference in load shape between DSM and QF energy deliveries. CV's 1989 projections of avoided energy costs for DSM were about 20% higher than contemporaneous projections for QFs.

- Avoided capacity costs for DSM should include reserves and T&D capacity.

- DSM avoided costs should include line losses.

CV will be paying $75/kW-yr for the contract, and reselling it at $42/kW-yr. (PABBST testimony, page 21)

- CV projects that 30% of its HQ Schedule A entitlement would have been surplus to its needs in the rate year, and that it would have been able to sell that surplus only at $3.60/MWH above the energy charge, rather than the $15/MWH difference between the total cost and the energy charge. (Exhibits PABBST 4 and 6)

In other words, CV no longer maintains that it can resell power for costs comparable to the costs of the HQ contract, at least in the short term.

Q: What is the third source of information?

A: In response to CLF-5, CV provided projections of the value of sales of HQ Schedule A capacity in the period 1991-1996. Attachment 2 reproduces the capacity sales costs projections, which range from one tenth to one sixth of the Schedule A demand charge.

Q: What is the fourth source of information?

A: In response to CLF-7 in this docket, CV has provided some confidential information on its evaluation of HQ versus alternatives. CV has provided a number of documents, which only minimally explain the values derived in them. Attachment 3 to this testimony includes the documents from CLF-7 I found pertinent.

Some of the documents address the date at which new resources would be needed. It appears that CV expected in

April 1991 to be in an excess capacity situation, even without the Sheldon Springs cogenerator, until the year 2000, two years later than estimated in the March 1991 NHPUC testimony.

Other parts of the response to CLF-7 address the cost-effectiveness of HQ compared to either CV's generic avoided cost, or a set of lower-cost purchased supplies.[3] Compared to the avoided costs, HQ is more expensive in every year until 1999; the cumulative present value of HQ costs is higher than the avoided costs through 2006.[4] Over the next five years, HQ is 88% more expensive than avoided cost; over 10 years, it is 14% more expensive.

Compared to the purchase option, HQ is more expensive in every year until 2002. The cumulative present value of HQ costs is higher than the alternatives through 2011. HQ is 37% more expensive over the first five years, 23% more expensive over 10 years, and 12% more expensive over 15 years.

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[3]The "CV avoided costs" are similar, but not identical, to the 1991 avoided costs listed in the NHPUC LCIP. The purchases assumed in the second option are shown to some extent in Attachment 3; to preserve the confidentiality of the material, I will not discuss them in the text.

[4]This cumulative present value is computed at a 9% discount rate. If CV estimated its discount rate in the manner it usually does, it is likely to be somewhat higher, delaying the point at which the cumulative present value of avoided costs rises to meet the cumulative present value of HQ.

5. CONCLUSIONS AND RECOMMENDATIONS

Q: What is the significance of the information you have discussed?

A: CV's purchase of high-cost HQ power has depressed avoided costs, which are now well below the cost of HQ. DSM measures installed this year with lives of up to 15 years will appear to be less cost-effective if compared to CV's avoided costs than if compared to the cost of the HQ purchase.[5] This category of measures covers a large portion of CV's DSM program.

Meanwhile, CV has shown limited interest in making long-term sales of the surplus HQ capacity, other than eliminating Schedule A. A request (CLF Request 6) for documents describing efforts to eliminate the surplus by realigning shares was answered by the production of a single letter, offering VJO capacity from May to October of this year. CV has asked HQ to buy back some or all Schedule C-1 capacity until 1995 (CLF Request 4), but does not appear to have offered the capacity to other utilities for a similar period, and does not seem to have offered the capacity to any party for the period of the surplus (e.g., through at least 1998,

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[5] The situation would be even worse if CV uses the purchases as the avoided costs for future DSM analyses. Measures with lives up to 20 years would be less cost-effective compared to the purchase options than compared to HQ.

and potentially later).[6] CV's failure to pursue vigorously these long-term sales is especially peculiar, in that the Board relied on such long-term capacity and energy resales to determine that any potential conflict between DSM and HQ would be resolvable.

As a result, the treatment of the HQ purchase as committed may cause CV to screen out a large number of DSM measures, programs, and projects that would be less expensive than the HQ purchase.[7] Hence, the social costs of CV's services will not be minimized and its planning will not be least-cost.

Q: How might the Board remove this conflict between HQ and DSM?

A: The simplest approach would be to compute avoided costs for DSM purposes by eliminating non-cost-effective HQ capacity. The process would start with CV's removing from its supply portfolio (for DSM evaluation purposes) enough HQ capacity so that the direct avoided cost for an HQ-type resource -- a baseload supply at 75% capacity factor -- rises to equal the cost of HQ. It does not matter for this purpose whether the capacity has been or will be sold in the future.

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[6]While CV might prefer to recapture some of the HQ capacity as early as 1999, sales from now through 2006 would be better than retaining the capacity for the entire period.

[7]It is important to recognize that DSM must be credited with its avoided T&D benefits, losses, planning risk, and externalities, and with its superior load shape, before its cost is compared with that of HQ or any other power supply.

The avoided cost of DSM would then be computed from the reduced supply portfolio. Since DSM generally has a more valuable load shape than does baseload generation,[8] the avoided costs of DSM will be higher than the cost of HQ. Since DSM also avoids losses, T&D costs, planning risks, and externalities, avoided costs will be still higher.

This approach ensures that all DSM less expensive than HQ is pursued, and will not be backed out by CV's excessive commitment to HQ.

Q: Do you have any other recommendations for the Board?

A: Yes. I suggest that the Board require that CV attempt to sell off surplus HQ capacity (i.e., the capacity that costs more than avoided costs) for the rest of the decade. As I discussed above, CV has predicted, both directly and through the VJO, that it can make such sales at or above the full cost of HQ power. In addition, HQ is seeking to purchase 750 MW of capacity, with contracts <u>starting</u> between now and 1995 (<u>Electric Utility Week</u>, July 8, 1991). Buying back its sales to Vermont in the late 1990s seems to be particularly advantageous to HQ, since this is the period in which HQ is exposed to the greatest combination of sales obligations (NEPOOL, Vermont, and New York) and supply planning risk, particularly with the legal uncertainties surrounding the construction of the Great Whale project, now planned for 1998.

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[8]That is, DSM saves more energy at high-load, high-cost hours than does baseload generation, tends to produce greater kW savings per kW than does supply, and avoids reserve requirements.

If CV extends its sales offer from the 1995 end date shown in Response CLF-4 to about 2000, the offer should be more attractive to HQ.

Second, given the importance of this issue, and the problems with fully exploring it in this proceeding, the Board should also order CV to report back on the status of the HQ purchases in a timely fashion. This report should include a fully documented analysis of the amount of the HQ purchases which would be cost-effective to sell off at full cost for various periods of time, ranging from sales for 1992-98 to sales for 1992-2006 or beyond. It should also describe CV's efforts to sell HQ capacity at full cost, or under other terms and conditions.

Third, I suggest that the Board put CV on notice that recovery of HQ future costs will be contingent on CV's demonstration that it has made a maximum good-faith effort to make long-run sales of the surplus. The failure of CV to have made such an effort to date would be sufficient grounds to deny recovery of the excess rate-year costs due to HQ, in the current proceeding. CV estimates those excess costs in 1992 to be approximately $14 million, as shown in Attachment 3 to this testimony.[9] Over the period 1992-1998, CV estimates the excess costs average about $13 million annually.

[9] To put this value in perspective, this is over half of the $26.3 million rate increase requested in this case, and about 8% of 1990 rates.

Q: Are you recommending that the Board disallow recovery of this costs in the current case?

A: Disallowance of costs of this magnitude may be an excessive remedy at this time. The HQ purchase was approved by the Board only about eight months ago, and uncertainties regarding the fate of the contract consumed a portion of that time. It is not realistic to expect CV to instantly realign its supply portfolio.

The Board's interests in promoting energy efficiency and least-cost planning may be best supported by some leniency in this proceeding, combined with a mechanism for continued review of CV's actions and with a clear statement that CV will be responsible for excess costs in the future.

Q: Does this conclude your testimony?

A: Yes.

ATTACHMENT 2

SAVINGS FROM SCH AILI DEAL
ASSUMING EXCESS CAPACITY SOLD w/o DEAL
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TABLE I

CHANGE IN MILLIONS OF DOLLARS
POSITIVE AMOUNTS INDICATE SAVINGS (COST REDUCTION) TO CVPS.

CAL. YEAR	GENERATION CAPACITY k$	PRODUCTION ENERGY k$	LOST CAPACITY SALES k$	TOTAL k$
1991	1,025.3	(114)	(117.3)	794.0
1992	1,745.4	(210)	(249.7)	1,285.7
1993	2,540.7	(276)	(420.2)	1,844.6
1994	2,654.6	(195)	(590.7)	1,868.9
1995	3,533.3	(414)	(760.9)	2,358.4
1996	4,474.8	(353)	(960.0)	3,161.8
1997	(1,198.0)			(1,198.0)
1998	(1,100.6)			(1,100.6)
1999	(1,100.6)			(1,100.6)
2000	(1,100.6)			(1,100.6)
2001	(1,100.6)			(1,100.6)
2002	(1,100.6)			(1,100.6)
2003	(1,100.6)			(1,100.6)
2004	(1,100.6)			(1,100.6)
2005	(1,100.6)			(1,100.6)
2006	(1,100.6)			(1,100.6)
2007	(1,100.6)			(1,100.6)
2008	(1,100.6)			(1,100.6)
2009	(1,100.6)			(1,100.6)
2010	(1,100.6)			(1,100.6)
2011	(1,100.6)			(1,100.6)
2012	(917.2)			(917.2)
NPV @ 9.0% '91$	6,252.2	(1,212.3)	(2,319.0)	2,720.9

29–Mar–91

TABLE II

	MW SOLD BACK TO HQ			ADDITIONAL MW PURCHASES FROM HQ			
CAL. YEAR	MW SOLD BACK TO HQ (5)	UNIT PRICE (1)	TOTAL SAVINGS (3) k$	CAPACITY MW (5)	UNIT PRICE (2)	TOTAL COST (4) k$	NET CAPACITY SAVINGS/COST k$
1991	23.039	66.76	1,025.3				1,025.3
1992	23.039	75.76	1,745.4				1,745.4
1993	23.039	110.28	2,540.7				2,540.7
1994	23.039	115.22	2,654.6				2,654.6
1995	23.039	153.36	3,533.3				3,533.3
1996	23.039	243.64	5,613.2	23.039	296.49	1,138.5	4,474.8
1997	23.039	244.49	5,632.8	23.039	296.49	6,830.8	(1,198.0)
1998	23.039	248.72	5,730.2	23.039	296.49	6,830.8	(1,100.6)
1999	23.039	248.72	5,730.2	23.039	296.49	6,830.8	(1,100.6)
2000	23.039	248.72	5,730.2	23.039	296.49	6,830.8	(1,100.6)
2001	23.039	248.72	5,730.2	23.039	296.49	6,830.8	(1,100.6)
2002	23.039	248.72	5,730.2	23.039	296.49	6,830.8	(1,100.6)
2003	23.039	248.72	5,730.2	23.039	296.49	6,830.8	(1,100.6)
2004	23.039	248.72	5,730.2	23.039	296.49	6,830.8	(1,100.6)
2005	23.039	248.72	5,730.2	23.039	296.49	6,830.8	(1,100.6)
2006	23.039	248.72	5,730.2	23.039	296.49	6,830.8	(1,100.6)
2007	23.039	248.72	5,730.2	23.039	296.49	6,830.8	(1,100.6)
2008	23.039	248.72	5,730.2	23.039	296.49	6,830.8	(1,100.6)
2009	23.039	248.72	5,730.2	23.039	296.49	6,830.8	(1,100.6)
2010	23.039	248.72	5,730.2	23.039	296.49	6,830.8	(1,100.6)
2011	23.039	248.72	5,730.2	23.039	296.49	6,830.8	(1,100.6)
2012	23.039	248.72	4,775.2	23.039	296.49	5,692.4	(917.2)

NOTE: 1 – SCH A PRICES ARE IN EFFECT UNTIL 9/22/95, AND SCH C–1 PRICES ARE IN EFFECT FROM 9/23/95 TIL 10/31/2012.

2 – THE ADDITIONAL MW PURCHASES ARE BEING BOUGHT AT SCH C–4 PRICES.

3 – SAVINGS ARE BASED ON 8 MONTHS IN 1991 AND ON 10 MONTHS IN 2012.

4 – COST ARE BASED ON 2 MONTHS IN 1996 AND ON 10 MONTHS IN 2012.

5 – MW BASED ON CVPS (22.725 MW) + ALLIED (0.314 MW).

29–Mar–91

TABLE III

LOST CAPACITY SALES

CAL. YEAR	MW SOLD BACK TO HQ	NEW UNIT ADJ. (25% x MW)	MONTHS	LOST CAP SELL VALUE $/kW-yr	LOST CAP DOLLARS k$
1991	23.039	5.760	8	6.11	117.3
1992	23.039	5.760	12	8.67	249.7
1993	23.039	5.760	12	14.59	420.2
1994	23.039	5.760	12	20.51	590.7
1995	23.039	5.760	12	26.42	760.9
1996	23.039	5.760	10	40.00	960.0
1997					
1998					
1999					
2000					
2001					
2002					
2003					
2004					
2005					
2006					
2007					
2008					
2009					
2010					
2011					
2012					

SAVINGS ASSUMING NO EXCESS CAPACITY SALES LOST

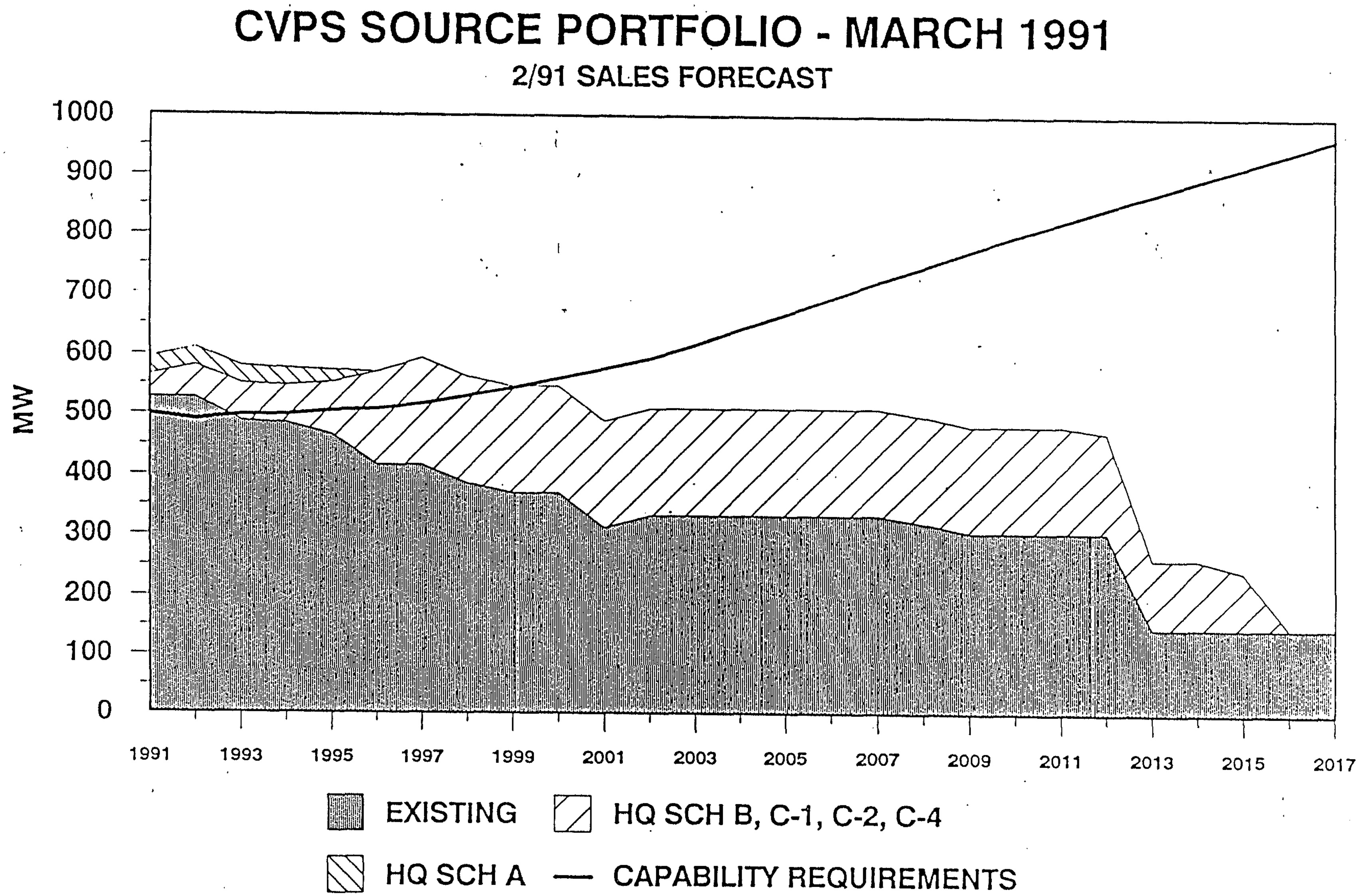
TABLE IV

CHANGE IN MILLIONS OF DOLLARS
POSITIVE AMOUNTS INDICATE SAVINGS (COST REDUCTION) TO CVPS.

CAL. YEAR	GENERATION CAPACITY k$	PRODUCTION ENERGY k$	LOST CAPACITY SALES k$	TOTAL k$
1991	1,025.3	(114)	0.0	911.3
1992	1,745.4	(210)	0.0	1,535.4
1993	2,540.7	(276)	0.0	2,264.7
1994	2,654.6	(195)	0.0	2,459.6
1995	3,533.3	(414)	0.0	3,119.3
1996	4,474.8	(353)	0.0	4,121.8
1997	(1,198.0)			(1,198.0)
1998	(1,100.6)			(1,100.6)
1999	(1,100.6)			(1,100.6)
2000	(1,100.6)			(1,100.6)
2001	(1,100.6)			(1,100.6)
2002	(1,100.6)			(1,100.6)
2003	(1,100.6)			(1,100.6)
2004	(1,100.6)			(1,100.6)
2005	(1,100.6)			(1,100.6)
2006	(1,100.6)			(1,100.6)
2007	(1,100.6)			(1,100.6)
2008	(1,100.6)			(1,100.6)
2009	(1,100.6)			(1,100.6)
2010	(1,100.6)			(1,100.6)
2011	(1,100.6)			(1,100.6)
2012	(917.2)			(917.2)
NPV @ 9.0% '91$	6,252.2	(1,212.3)	0.0	5,039.9

ATTACHMENT 3

CONFIDENTIAL



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RJL 4/22/91

HYDRO QUEBEC vs. CVPS' AVOIDED COST

			1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
HQ BUY BACK CAPACITY COST		MW												
HQ SCH B														
CAP COST – $/kW–yr		92.200				262.73	262.73	262.73	262.73	262.73	262.73	262.73	262.73	262.73
CAP COST	($000)					7,148.9	26,067.7	26,067.7	26,067.7	26,067.7	26,067.7	26,067.7	26,067.7	26,067.7
HQ SCH C–1														
CAP COST – $/kW–yr		29.800	193.82	237.93	237.93	237.93	237.93	238.76	242.89	242.89	242.89	242.89	242.89	242.89
CAP COST	($000)	6.800	5,769.9	7,090.3	7,090.3	5,590.0	1,617.9	1,623.5	1,651.6	1,651.6	1,651.6	1,651.6	1,651.6	1,651.6
HQ SCH C–2														
CAP COST – $/kW–yr		20.000	248.22	248.22	248.22	248.22	248.22	248.39	249.23	249.23	249.23	249.23	249.23	249.23
CAP COST	($000)		3,309.6	4,964.3	4,964.3	4,964.3	4,964.3	4,967.7	4,984.7	4,984.7	4,984.7	4,984.7	4,984.7	4,984.7
HQ SCH C–4														
CAP COST – $/kW–yr		23.000					296.49	296.49	296.49	296.49	296.49	296.49	296.49	296.49
CAP COST	($000)						1,136.5	6,819.3	6,819.3	6,819.3	6,819.3	6,819.3	6,819.3	6,819.3
HQ BUY BACK ENERGY COST		MW												
HQ SCH B														
ENERGY COST – ¢/kWh @ CV @ 75% C.F.		92.200				2.68	2.80	2.92	3.05	3.18	3.32	3.47	3.62	3.78
ENERGY COST	($000)					4,456.4	16,964.1	17,705.5	18,481.0	19,268.8	20,133.4	21,017.3	21,939.9	22,903.1
HQ SCH C–1														
ENERGY COST – ¢/kWh @ CV @ 75% C.F.		29.800	2.40	2.46	2.57	2.68	2.80	2.92	3.05	3.18	3.32	3.47	3.62	3.78
ENERGY COST	($000)	6.800	4,694.4	4,818.5	5,035.4	4,143.7	1,251.2	1,305.8	1,363.0	1,422.6	1,484.9	1,550.1	1,618.1	1,689.2
HQ SCH C–2														
ENERGY COST – ¢/kWh @ CV @ 75% C.F.		20.000	2.35	2.46	2.57	2.68	2.80	2.92	3.05	3.18	3.32	3.47	3.62	3.78
ENERGY COST	($000)		2,069.8	3,233.9	3,379.4	3,527.5	3,679.9	3,840.7	4,008.9	4,184.1	4,367.3	4,559.1	4,759.2	4,968.1
HQ SCH C–4														
ENERGY COST – ¢/kWh @ CV @ 75% C.F.		23.000					2.80	2.92	3.05	3.18	3.32	3.47	3.62	3.78
ENERGY COST	($000)						705.3	4,416.8	4,610.2	4,811.7	5,022.4	5,242.9	5,473.1	5,713.4
HQ BUY BACK TOTAL COST		MW												
HQ SCH B														
TOTAL COST – $/MWh @ CV @ 75% C.F.		92.200				69.88	71.04	72.26	73.54	74.88	76.27	77.73	79.25	80.84
TOTAL COST	($000)					11,606.3	43,031.8	43,773.1	44,548.6	45,366.3	46,201.1	47,065.0	48,007.6	48,970.8
HQ SCH C–1														
TOTAL COST – $/MWh @ CV @ 75% C.F.		29.800	53.45	60.83	61.93	63.06	64.22	65.57	67.48	68.81	70.21	71.67	73.19	74.78
TOTAL COST	($000)	6.800	10,464.3	11,908.9	12,125.7	9,733.7	2,869.1	2,929.4	3,014.7	3,074.2	3,136.5	3,201.7	3,269.8	3,340.8
HQ SCH C–2														
TOTAL COST – $/MWh @ CV @ 75% C.F.		20.000	61.29	62.39	63.50	64.63	65.79	67.04	68.44	69.78	71.17	72.63	74.15	75.74
TOTAL COST	($000)		5,369.3	8,196.3	8,343.8	8,491.8	8,644.2	8,808.4	8,993.6	9,168.8	9,352.0	9,543.8	9,743.9	9,952.8
HQ SCH C–4														
TOTAL COST – $/MWh @ CV @ 75% C.F.		23.000					73.13	74.36	75.64	76.97	78.36	79.82	81.35	82.94
TOTAL COST	($000)						1,841.9	11,236.0	11,429.5	11,631.0	11,841.7	12,062.2	12,292.4	12,532.6
HQ BUY BACK TOTAL NPV COST '91$														
DISCOUNT RATE =	9.00%													
HQ SCH B														
LEVELIZED – $/MWh @ CV @ 75% C.F.		81.13												
TOTAL NPV COST	($000)	326,319.5												
HQ SCH C–1														
LEVELIZED – $/MWh @ CV @ 75% C.F.		63.76												
TOTAL NPV COST	($000)	55,730.7												
HQ SCH C–2														
LEVELIZED – $/MWh @ CV @ 75% C.F.		70.94												
TOTAL NPV COST	($000)	83,516.9												
HQ SCH C–4														
LEVELIZED – $/MWh @ CV @ 75% C.F.		82.92												
TOTAL NPV COST	($000)	68,706.8												
CVPS' TOTAL COMMITMENT THRU HQ BUY BACK			1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TOTAL COST	($000)		15,833.7	20,107.2	20,469.5	29,830.8	56,366.9	66,747.0	67,966.4	69,230.2	70,531.4	71,892.6	73,313.6	74,797.0
TOTAL NPV COST '91$	($000)	534,274.0												
TOTAL WEIGHTED – $/MWh			55.87	61.45	62.56	66.02	69.87	71.54	72.87	74.21	75.80	77.06	78.58	80.17
LEVELIZED WEIGHTED $/MWh		77.41												

HYDRO QUEBEC vs. CVPS' AVOIDED COST

			1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
CVPS' AVOIDED COST														
MW NEEDED TO REPLACE HQ	(MW)		0.0	0.0	0.0	25.5	78.9	87.7	132.8	160.0	157.9	169.7	166.8	168.3
AVOIDED CAPACITY COST ($/kW-yr)			51.99	73.22	96.65	106.51	116.36	121.57	214.25	367.66	386.26	405.80	426.33	447.90
TOTAL CAPACITY COST	($000)		0.0	0.0	0.0	2,767.1	9,180.9	10,662.1	28,451.8	58,825.8	60,990.6	68,864.6	71,112.1	75,381.5
HQ FREE DISPATCH GWh FROM UPLAN			139.86	158.49	296.47	419.04	615.49	576.45	775.78	881.22	888.01	903.02	906.36	907.82
AVOIDED ENERGY COST (¢/kWh)			2.96	2.94	3.37	3.10	4.68	4.91	4.92	2.78	3.19	2.13	2.03	4.18
TOTAL ENERGY COST @ HQ GWh	($000)		4,127.6	4,656.3	9,965.3	12,977.6	28,799.5	28,281.6	38,145.7	24,525.9	28,337.3	19,271.3	18,377.2	37,923.2
TOTAL COST @ AVOIDED COST	($000)		4,127.6	4,656.3	9,965.3	15,744.7	37,960.4	38,943.7	66,597.5	83,351.7	89,327.9	88,135.9	89,489.3	113,304.8
TOTAL NPV COST '91$	($000)	620,364.7												
TOTAL WEIGHTED – $/MWh			29.51	29.38	33.68	37.57	61.71	67.56	85.85	94.59	100.59	97.60	98.85	124.81
LEVELIZED WEIGHTED $/MWh		102.55												
REPLACEMENT COSTS														
PHASE II SAVINGS w/HQ			(3,123.0)	(3,915.0)	(4,537.0)	(3,740.0)	(4,451.0)	(4,523.0)	(4,781.0)	(5,060.0)	(5,430.0)	(5,864.0)	(6,323.0)	(6,762.0)
PHASE II SAVINGS w/o HQ			(4,477.0)	(4,814.0)	(5,580.0)	(4,600.0)	(5,474.0)	(5,563.0)	(5,880.0)	(6,222.0)	(6,678.0)	(7,211.0)	(7,776.0)	(8,316.0)
DELTA			1,354.0	899.0	1,043.0	860.0	1,023.0	1,040.0	1,099.0	1,162.0	1,248.0	1,347.0	1,453.0	1,554.0
TOTAL NPV COST '91$	($000)	13,907.8												
T. BY O. w/HQ			17,422.0	17,720.0	17,714.0	17,706.0	17,750.0	17,757.0	17,817.0	17,884.0	18,189.0	19,156.0	18,356.0	18,727.0
T. BY O. w/o HQ			16,288.0	16,614.0	16,632.0	16,649.0	16,714.0	16,744.0	16,826.0	16,915.0	17,242.0	18,347.0	17,573.0	17,969.0
DELTA			1,134.0	1,106.0	1,082.0	1,059.0	1,036.0	1,013.0	991.0	969.0	947.0	809.0	783.0	758.0
TOTAL NPV COST '91$	($000)	7,062.3												
EXCESS CAPACITY REV. w/HQ			(520.0)	(875.0)	(1,230.0)	(1,585.0)	(1,940.0)	(2,034.0)	(2,132.0)	0.0	0.0	0.0	0.0	0.0
EXCESS CAPACITY REV. w/o HQ			(520.0)	0.0	0.0	0.0	(1,940.0)	(2,034.0)	(2,132.0)	0.0	0.0	0.0	0.0	0.0
DELTA			0.0	(875.0)	(1,230.0)	(1,585.0)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL NPV COST '91$	($000)	(2,809.1)												
OFF-SYSTEM SALES w/HQ			(369.0)	(465.0)	(589.0)	(706.0)	(769.0)	(2,140.0)	(1,092.0)	(342.0)	(295.0)	0.0	0.0	0.0
OFF-SYSTEM SALES w/o HQ			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DELTA			(369.0)	(465.0)	(589.0)	(706.0)	(769.0)	(2,140.0)	(1,092.0)	(342.0)	(295.0)	0.0	0.0	0.0
TOTAL NPV COST '91$	($000)	(4,366.9)												
COST SUMMARY			1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
SAVINGS/(INCREASE) IN COST	($000)		13,825.0	16,115.8	10,790.2	13,712.1	19,696.6	27,716.3	2,386.9	(12,332.5)	(16,896.5)	(14,067.3)	(13,939.7)	(36,195.7)
PV IN '91$ SAVINGS/(INCREASE) IN COST	($000)		12,683.5	13,564.4	8,332.0	9,714.0	12,801.4	16,526.3	1,305.7	(6,189.2)	(7,779.6)	(5,950.6)	(5,402.1)	(12,868.8)
CPVD IN '91$	($000)		12,683.5	26,247.9	34,579.9	44,294.0	57,095.4	73,621.7	74,927.4	68,738.1	60,958.5	55,007.9	49,605.8	36,737.0

BENEFIT COST RATIO 1.13

****************** NPV ******************

BENEFITS	COSTS	DIFFERENCE
627,540.7	555,264.1	(72,276.6)

RJL 19-Apr-91

HYDRO QUEBEC vs. CVPS' AVOIDED COST

		MW	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
HQ BUY BACK CAPACITY COST														
HQ SCH B														
CAP COST – $/kW–yr		92.200	282.73	282.73	282.73	282.73	282.73	282.73	282.73	282.73	282.73	282.73	282.73	282.73
CAP COST	($000)		26,067.7	26,067.7	26,067.7	26,067.7	26,067.7	26,067.7	26,067.7	26,067.7	26,067.7	26,067.7	26,067.7	21,723.1
HQ SCH C–1														
CAP COST – $/kW–yr		29.800	242.89	242.89	242.89	242.89	242.89	242.89	242.89	242.89	242.89			
CAP COST	($000)	6.800	1,651.6	1,651.6	1,651.6	1,651.6	1,651.6	1,651.6	1,651.6	1,651.6	1,376.4			
HQ SCH C–2														
CAP COST – $/kW–yr		20.000	249.23	249.23	249.23	249.23	249.23	249.23	249.23	249.23	249.23			
CAP COST	($000)		4,984.7	4,984.7	4,984.7	4,984.7	4,984.7	4,984.7	4,984.7	4,984.7	4,153.9			
HQ SCH C–4														
CAP COST – $/kW–yr		23.000	296.49	296.49	296.49	296.49	296.49	296.49	296.49	296.49	296.49			
CAP COST	($000)		6,819.3	6,819.3	6,819.3	6,819.3	6,819.3	6,819.3	6,819.3	6,819.3	5,682.7			
HQ BUY BACK ENERGY COST		MW												
HQ SCH B														
ENERGY COST – ¢/kWh @ CV @ 75% C.F.		92.200	3.95	4.12	4.30	4.49	4.69	4.90	5.12	5.34	5.58	5.83	6.09	6.36
ENERGY COST	($000)		23,906.5	24,960.5	26,061.3	27,206.0	28,410.6	29,672.0	30,989.4	32,365.4	33,802.4	35,303.2	36,870.7	32,069.8
HQ SCH C–1														
ENERGY COST – ¢/kWh @ CV @ 75% C.F.		29.800	3.95	4.12	4.30	4.49	4.69	4.90	5.12	5.34	5.58			
ENERGY COST	($000)	6.800	1,763.3	1,840.9	1,922.1	2,006.7	2,095.4	2,188.4	2,285.6	2,387.0	2,077.5			
HQ SCH C–2														
ENERGY COST – ¢/kWh @ CV @ 75% C.F.		20.000	3.95	4.12	4.30	4.49	4.69	4.90	5.12	5.34	5.58			
ENERGY COST	($000)		5,166.2	5,414.4	5,653.2	5,901.9	6,162.8	6,436.4	6,722.2	7,020.7	6,110.3			
HQ SCH C–4														
ENERGY COST – ¢/kWh @ CV @ 75% C.F.		23.000	3.95	4.12	4.30	4.49	4.69	4.90	5.12	5.34	5.58			
ENERGY COST	($000)		5,964.2	6,226.6	6,501.2	6,787.2	7,087.2	7,401.9	7,730.6	8,073.8	7,026.9			
HQ BUY BACK TOTAL COST		MW												
HQ SCH B														
TOTAL COST – $/MWh @ CV @ 75% C.F.		92.200	82.50	84.24	86.06	87.96	89.93	92.02	94.19	96.46	98.84	101.31	103.90	106.60
TOTAL COST	($000)		49,976.2	51,028.2	52,129.0	53,273.7	54,478.2	55,739.7	57,057.1	58,433.0	59,870.1	61,370.9	62,938.4	53,812.8
HQ SCH C–1														
TOTAL COST – $/MWh @ CV @ 75% C.F.		29.800	76.44	78.17	79.99	81.89	83.87	85.95	88.13	90.40	92.77			
TOTAL COST	($000)	6.800	3,415.0	3,492.5	3,573.7	3,658.3	3,747.0	3,840.0	3,937.2	4,038.7	3,453.9			
HQ SCH C–2														
TOTAL COST – $/MWh @ CV @ 75% C.F.		20.000	77.40	79.14	80.96	82.86	84.84	86.92	89.09	91.37	93.74			
TOTAL COST	($000)		10,170.9	10,399.1	10,637.9	10,866.6	11,147.5	11,421.1	11,706.9	12,005.4	10,264.2			
HQ SCH C–4														
TOTAL COST – $/MWh @ CV @ 75% C.F.		23.000	84.60	86.33	88.15	90.04	92.03	94.11	96.29	98.56	100.93			
TOTAL COST	($000)		12,783.5	13,045.9	13,320.5	13,606.5	13,906.5	14,221.2	14,549.9	14,893.1	12,709.6			

HQ BUY BACK TOTAL NPV COST '91$

DISCOUNT RATE =	9.00%	
HQ SCH B		
LEVELIZED – $/MWh @ CV @ 75% C.F.		81.13
TOTAL NPV COST	($000)	326,319.5
HQ SCH C–1		
LEVELIZED – $/MWh @ CV @ 75% C.F.		83.76
TOTAL NPV COST	($000)	55,730.7
HQ SCH C–2		
LEVELIZED – $/MWh @ CV @ 75% C.F.		70.94
TOTAL NPV COST	($000)	83,515.9
HQ SCH C–4		
LEVELIZED – $/MWh @ CV @ 75% C.F.		82.92
TOTAL NPV COST	($000)	68,706.8

CVPS' TOTAL COMMITMENT THRU HQ BUY BACK			2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
TOTAL COST	($000)		78,345.6	77,965.7	79,661.0	81,427.1	83,279.3	85,222.0	87,251.0	89,370.2	86,297.8	61,370.9	62,938.4	53,812.8
TOTAL NPV COST '91$	($000)	534,274.0												
TOTAL WEIGHTED – $/MWh			81.83	83.57	85.39	87.28	89.27	91.35	93.52	95.79	98.24	101.31	103.90	106.60
LEVELIZED WEIGHTED $/MWh		77.41												

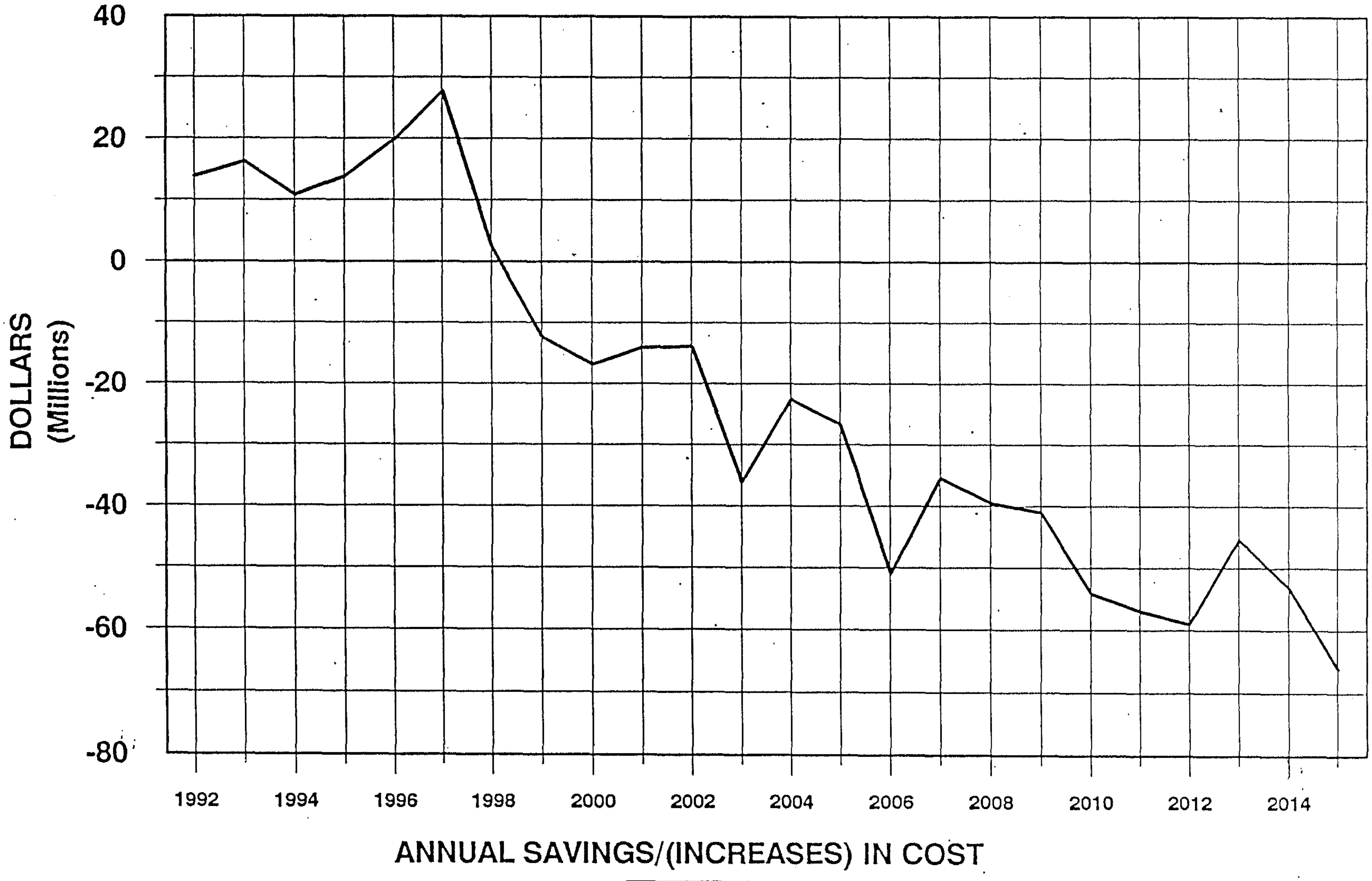
HYDRO QUEBEC vs. CVPS' AVOIDED COST

			2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
CVPS' AVOIDED COST														
MW NEEDED TO REPLACE HQ	(MW)		168.9	169.2	171.0	169.3	171.2	168.8	169.2	173.0	161.8	106.8	112.1	90.8
AVOIDED CAPACITY COST ($/kW-yr)			470.56	494.36	519.37	545.65	573.25	602.26	632.72	664.73	698.36	733.69	770.81	809.80
TOTAL CAPACITY COST	($000)		79,477.4	83,646.5	88,813.1	92,378.5	96,141.1	101,660.7	107,056.8	114,996.7	112,994.9	79,825.6	86,407.7	73,530.2
HQ FREE DISPATCH GWh FROM UPLAN			911.66	909.92	909.89	912.04	910.06	910.03	912.13	910.09	910.05	594.63	594.68	594.72
AVOIDED ENERGY COST (¢/kWh)			2.40	2.59	4.88	2.98	3.01	3.02	3.89	3.57	3.71	4.83	5.32	8.21
TOTAL ENERGY COST @ HQ GWh	($000)		21,915.8	23,548.9	44,386.0	27,201.3	27,416.8	27,489.6	35,449.2	32,448.0	33,765.8	28,706.0	31,625.6	48,802.5
TOTAL COST @ AVOIDED COST	($000)		101,393.2	107,195.4	133,199.1	119,579.8	125,557.7	129,150.2	142,505.9	147,446.8	146,760.4	106,530.6	118,033.3	122,332.7
TOTAL NPV COST '91$	($000)	620,364.7												
TOTAL WEIGHTED – $/MWh			111.19	117.81	146.39	131.11	137.97	141.92	156.23	162.01	161.27	182.52	196.49	205.70
LEVELIZED WEIGHTED $/MWh		102.55												
REPLACEMENT COSTS														
PHASE II SAVINGS w/HQ			(7,258.0)	(7,765.0)	(8,251.0)	(8,851.0)	(9,403.0)	(9,967.0)	(10,608.0)	(11,267.0)	(11,967.0)	(12,710.0)	(13,500.0)	(14,339.0)
PHASE II SAVINGS w/o HQ			(8,926.0)	(9,549.0)	(10,147.0)	(10,885.0)	(11,564.0)	(12,263.0)	(13,046.0)	(13,856.0)	(14,717.0)	(15,631.0)	(16,602.0)	(17,634.0)
DELTA			1,668.0	1,784.0	1,896.0	2,034.0	2,161.0	2,296.0	2,438.0	2,589.0	2,750.0	2,921.0	3,102.0	3,295.0
TOTAL NPV COST '91$	($000)	13,907.8												
T. BY O. w/HQ			19,196.0	19,704.0	20,256.0	20,925.0	21,729.0	22,763.0	23,537.0	24,278.0	25,351.0	29,705.0	30,826.0	32,548.0
T. BY O. w/o HQ			18,463.0	18,997.0	19,574.0	20,269.0	21,097.0	22,156.0	24,926.0	25,778.0	26,686.0	30,878.0	32,050.0	33,401.0
DELTA			733.0	707.0	682.0	656.0	632.0	607.0	(1,389.0)	(1,500.0)	(1,335.0)	(1,173.0)	(1,224.0)	(853.0)
TOTAL NPV COST '91$	($000)	7,062.3												
EXCESS CAPACITY REV. w/HQ			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EXCESS CAPACITY REV. w/o HQ			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DELTA			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL NPV COST '91$	($000)	(2,809.1)												
OFF-SYSTEM SALES w/HQ			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OFF-SYSTEM SALES w/o HQ			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DELTA			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL NPV COST '91$	($000)	(4,366.9)												
COST SUMMARY			2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
SAVINGS/(INCREASE) IN COST	($000)		(22,646.7)	(26,738.7)	(50,960.0)	(35,462.7)	(39,485.5)	(41,025.2)	(54,205.9)	(56,967.6)	(59,047.6)	(45,411.7)	(53,217.0)	(68,077.9)
PV IN '91$ SAVINGS/(INCREASE) IN COST	($000)		(7,386.9)	(8,001.5)	(13,990.5)	(8,932.0)	(9,124.0)	(8,697.1)	(10,542.5)	(10,168.3)	(9,666.0)	(6,820.0)	(7,332.3)	(8,352.6)
CPVD IN '91$	($000)		29,350.1	21,348.7	7,358.2	(1,573.8)	(10,697.8)	(19,394.9)	(29,937.4)	(40,105.7)	(49,771.7)	(56,591.7)	(63,924.0)	(72,276.6)

BENEFIT COST RATIO 1.13

RJL 19-Apr-91

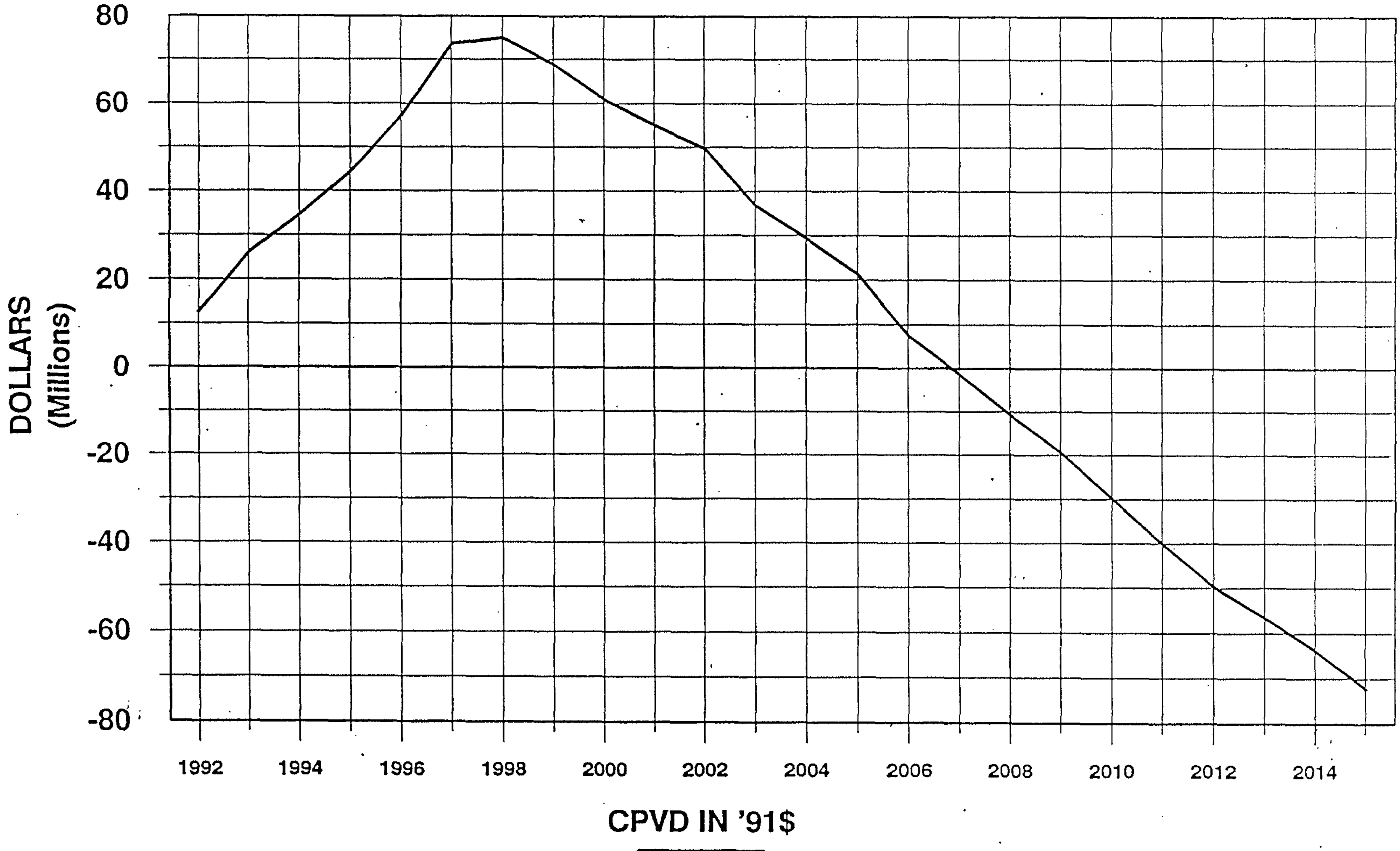
HYDRO QUEBEC vs. CVPS' AVOIDED COST



HQSCHCST.WK3
RJL 4/17/91

HYDRO QUEBEC vs. CVPS' AVOIDED COST

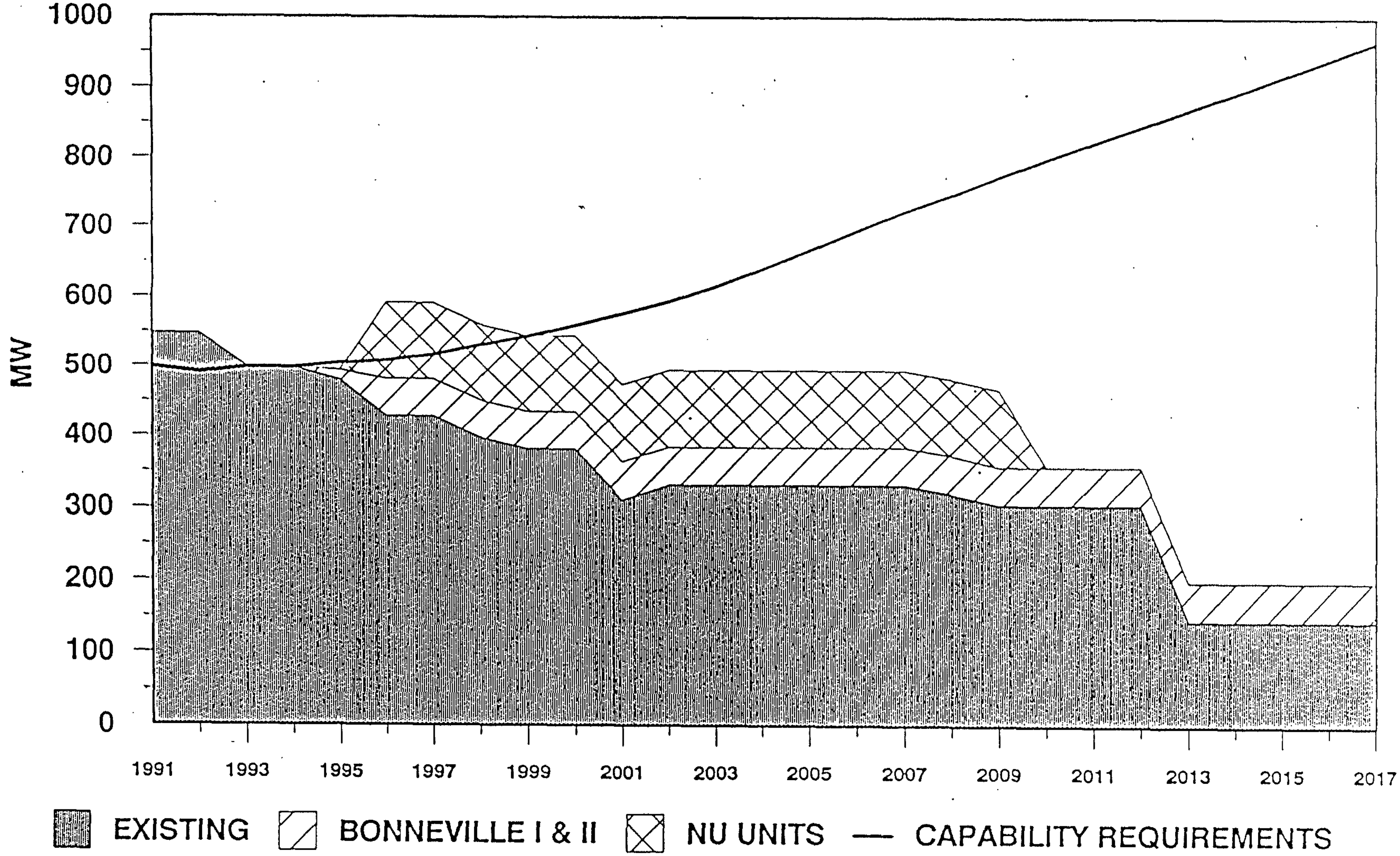
DISCOUNT FACTOR = 9.0%



HQSCHCST.WK3
RJL 4/17/91

CVPS SOURCE PORTFOLIO, NO HQ - MARCH 1991

2/91 SALES FORECAST



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GRAPH NAME : AREA; w/o E.GEORGIA

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18-Apr-91

HYDRO QUEBEC \ VJO CONTRACT EVALUATION – BONN I & II, NU 110 MW OIL BLOCK & GENERIC UNITS USED AS REPLACEMENT

(000's)

	MW / VAR	NPV'S 5-YR 1992–1996	NPV'S 10-YR 1992–2001	NPV'S 24-YR 1992–2015	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
CAPACITY COSTS	MW																		
SCH A	0.0				$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
SCH B	92.2				$0	$0	$0	$8,669	$26,068	$26,068	$26,068	$26,068	$26,068	$26,068	$26,068	$26,068	$26,068	$26,068	$26,068
SCH C1	29.8 & 6.6				$5,772	$7,093	$7,093	$5,687	$1,618	$1,624	$1,652	$1,652	$1,652	$1,652	$1,652	$1,652	$1,652	$1,652	$1,652
SCH C2	20.0				$3,315	$4,972	$4,972	$4,972	$4,972	$4,975	$4,992	$4,992	$4,992	$4,992	$4,992	$4,992	$4,992	$4,992	$4,992
SCH C4	23.0				$0	$0	$0	$0	$1,137	$6,819	$6,819	$6,819	$6,819	$6,819	$6,819	$6,819	$6,819	$6,819	$6,819
TOTAL					$9,087	$12,065	$12,065	$18,348	$33,794	$38,486	$39,531	$39,531	$39,531	$39,531	$39,531	$39,531	$39,531	$39,531	$39,531
BEN/COST	VAR																		
TOTAL HQ VJO	D1	$63,478	$163,386	$286,906	$9,087	$12,065	$12,065	$18,348	$33,794	$38,486	$39,531	$39,531	$39,531	$39,531	$39,531	$39,531	$39,531	$39,531	$39,531
TOTAL CAPACITY																			
HQIN491					$78,417	$82,241	$80,510	$91,224	$112,312	$114,314	$120,925	$121,088	$118,010	$141,722	$152,228	$157,898	$173,082	$189,323	$189,279
HQOUT491					$69,330	$70,176	$68,550	$76,567	$101,304	$98,206	$105,359	$105,562	$102,930	$135,006	$146,886	$157,582	$173,806	$193,760	$195,157
DELTA		$45,264	$80,955	$26,742	$9,087	$12,065	$11,960	$14,657	$11,008	$16,108	$15,566	$15,524	$15,080	$6,716	$5,342	$316	($723)	($4,437)	($5,878)
REPLACEMENT COST	N1	$18,214	$82,431	$260,164	$0	$0	$105	$4,892	$22,786	$23,378	$23,965	$24,007	$24,451	$32,815	$34,189	$39,215	$40,254	$43,968	$45,409
PHASE II SAVINGS																			
HQIN491					($3,123)	($3,915)	($4,537)	($3,740)	($4,451)	($4,523)	($4,781)	($5,060)	($5,430)	($5,864)	($6,323)	($6,782)	($7,258)	($7,765)	($8,251)
HQOUT491					($4,477)	($4,814)	($5,580)	($4,600)	($5,474)	($5,563)	($5,880)	($6,222)	($6,678)	($7,211)	($7,776)	($8,316)	($8,926)	($9,549)	($10,147)
DELTA	D2	$4,079	$7,027	$13,906	$1,355	$900	$1,043	$860	$1,023	$1,039	$1,099	$1,163	$1,248	$1,347	$1,453	$1,554	$1,668	$1,784	$1,896
OTHER T.BY O.																			
HQIN491					$17,422	$17,720	$17,714	$17,708	$17,750	$17,757	$17,817	$17,884	$18,189	$19,156	$18,356	$18,727	$19,196	$19,704	$20,256
HQOUT491					$16,288	$16,614	$16,632	$16,649	$16,714	$16,744	$16,826	$16,915	$17,242	$18,347	$17,573	$17,969	$18,463	$18,997	$19,574
DELTA	D3	$4,229	$6,639	$7,081	$1,133	$1,106	$1,082	$1,059	$1,036	$1,013	$991	$969	$947	$809	$783	$758	$732	$707	$682
EXCESS CAPACITY REV.																			
HQIN491					($520)	($875)	($1,230)	($1,585)	($1,940)	($2,034)	($2,132)	$0	$0						
HQOUT491					($520)	$0	$0	$0	($1,940)	($2,034)	($2,132)	$0	$0						
DELTA	N3	($2,810)	($2,810)	($2,810)	$0	($875)	($1,230)	($1,585)	$0	$0	$0	$0	$0						
NON-FIRM OSS REV.																			
DELTA	N4	($2,186)	($4,367)	($4,367)	($369)	($465)	($589)	($708)	($769)	($2,140)	($1,092)	($342)	($295)						
PRODUCTION COSTS																			
HQ B & C1,C2,C4	D4	$42,060	$114,949	$244,558	$6,337	$7,844	$8,206	$12,853	$21,852	$26,542	$27,726	$29,103	$30,241	$31,842	$33,133	$34,390	$35,990	$37,707	$38,146
HQIN491 (MUST RUN PKR)					$42,347	$48,245	$48,544	$55,438	$56,705	$60,089	$75,139	$84,000	$83,094	$102,740	$105,714	$106,529	$142,591	$157,252	$167,162
HQOUT491					$43,399	$50,044	$50,304	$61,461	$58,896	$59,408	$77,944	$93,769	$94,218	$110,627	$118,767	$117,159	$151,454	$170,495	$177,103
DELTA		($9,529)	($24,014)	($75,309)	($1,052)	($1,799)	($1,760)	($6,023)	($2,191)	$681	($2,805)	($9,769)	($11,124)	($7,887)	($13,053)	($10,630)	($8,863)	($13,243)	($9,941)
HQINDISP(HQ DISPATCHABLE)					$41,960	$48,076	$48,479	$54,460	$54,517	$54,700	$72,440	$83,243	$82,578	$102,567	$106,009	$106,551	$142,663	$160,167	$167,236
HQOUT491					$43,399	$50,044	$50,304	$61,461	$58,896	$59,408	$77,944	$93,769	$94,218	$110,627	$118,767	$117,159	$151,454	$170,495	$177,103
DELTA		($12,192)	($32,056)	($83,237)	($1,439)	($1,968)	($1,825)	($7,001)	($4,379)	($4,708)	($5,504)	($10,526)	($11,640)	($8,060)	($12,758)	($10,630)	($8,863)	($13,243)	($9,941)
HQ RPLCMNT COST – DISP	N5	$54,252	$147,005	$327,795	$7,776	$9,812	$10,031	$19,854	$26,231	$31,250	$33,230	$39,629	$41,881	$39,702	$45,891	$45,020	$44,853	$50,950	$49,087
HQ PENALTY	N6	$2,662	$8,043	$7,928	$387	$169	$65	$978	$2,188	$5,369	$2,699	$757	$516	$173	($295)	$0	$0	$0	$0
COST SUMMARY																			
HQ VJO CAPACITY COSTS					$9,087	$12,065	$12,065	$19,348	$33,794	$38,486	$39,531	$39,531	$39,531	$39,531	$39,531	$39,531	$39,531	$39,531	$39,531
COST TO REPLACE HQ VJO					$0	$0	($105)	($4,892)	($22,786)	($23,378)	($23,965)	($24,007)	($24,451)	($32,815)	($34,189)	($39,215)	($40,254)	($43,968)	($45,409)
INCREASE IN PHASE II SAVINGS					$1,355	$900	$1,043	$860	$1,023	$1,039	$1,099	$1,163	$1,248	$1,347	$1,453	$1,554	$1,668	$1,784	$1,896
LOST CAPACITY SALE REVENUE					$0	($875)	($1,230)	($1,585)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
CHANGE TO T.BYO. EXC PH II SAVINGS					$1,133	$1,106	$1,082	$1,059	$1,036	$1,013	$991	$969	$947	$809	$783	$758	$732	$707	$682
CHANGE TO PRODUCTION COSTS					($1,052)	($1,799)	($1,760)	($6,023)	($2,191)	$681	($2,805)	($9,769)	($11,124)	($7,887)	($13,053)	($10,630)	($8,863)	($13,243)	($9,941)
CHANGE TO NON-FIRM OSS REV					($369)	($465)	($589)	($708)	($769)	($2,140)	($1,092)	($342)	($295)	$0	$0	$0	$0	$0	$0
NOMINAL NET SAVINGS\(INCREASES)					$10,154	$10,931	$10,505	$8,258	$10,107	$16,702	$13,758	$7,544	$5,656	$986	($5,474)	($8,002)	($7,186)	($15,186)	($13,241)
PRESENT VALUE IN '91 $'S NET SAVINGS\(INCREASES)				9.00%	$9,315	$9,201	$8,112	$5,650	$6,569	$9,959	$7,526	$3,786	$2,606	$416	($2,121)	($2,845)	($2,344)	($4,545)	($3,635)
CUM PRESENT VALUE		$39,047	$63,430	92 – 15 ($34,754)	$9,315	$18,516	$26,628	$32,478	$39,047	$49,005	$56,532	$60,318	$63,014	$63,430	$61,309	$58,464	$56,120	$51,575	$47,940

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16-Apr-91

HQ\VJO CONTRACT EVALUATION–BONN I & II, NU OFFER & GEN UNITS

		2007	2008	2009	2010	2011	2012	2013	2014	2015
CAPACITY COSTS	MW									
SCH A	0.0	$0	$0	$0	$0	$0	$0	$0	$0	$0
SCH B	92.2	$26,068	$26,068	$26,068	$26,068	$26,068	$26,068	$26,068	$26,068	$21,723
SCH C1	29.8 & 6.8	$1,652	$1,652	$1,652	$1,652	$1,652	$1,376	$0	$0	$0
SCH C2	20.0	$4,992	$4,992	$4,992	$4,992	$4,992	$4,160	$0	$0	$0
SCH C4	23.0	$6,819	$6,819	$6,819	$6,819	$6,819	$5,683	$0	$0	$0
TOTAL		$38,531	$38,531	$38,531	$38,531	$38,531	$37,287	$26,068	$26,068	$21,723
	BEN/COST VAR									
TOTAL HQ VJO	D1	$38,531	$38,531	$38,531	$38,531	$38,531	$37,287	$26,068	$26,068	$21,723
TOTAL CAPACITY										
HQIN491		$212,646	$239,217	$245,013	$277,443	$302,431	$310,492	$354,035	$370,949	$406,567
HQOUT491		$222,517	$250,757	$255,954	$333,068	$354,228	$359,697	$396,260	$415,298	$447,529
DELTA		($9,871)	($11,540)	($10,941)	($55,626)	($51,797)	($49,205)	($42,224)	($44,349)	($40,962)
REPLACEMENT COST	N1	$49,402	$51,071	$50,472	$95,157	$91,328	$86,492	$68,292	$70,417	$62,685
PHASE II SAVINGS										
HQIN491		($8,851)	($9,403)	($9,987)	($10,608)	($11,267)	($11,967)	($12,710)	($13,500)	($14,339)
HQOUT491		($10,885)	($11,564)	($12,283)	($13,046)	($13,856)	($14,717)	($15,631)	($16,602)	($17,634)
DELTA	D2	$2,034	$2,161	$2,295	$2,438	$2,589	$2,750	$2,921	$3,102	$3,295
OTHER T.BY O.										
HQIN491		$20,925	$21,729	$22,763	$23,537	$24,278	$25,351	$28,705	$30,826	$32,548
HQOUT491		$20,269	$21,097	$22,156	$24,926	$25,778	$26,686	$30,878	$32,050	$33,401
DELTA	D3	$657	$632	$608	($1,389)	($1,501)	($1,335)	($1,173)	($1,225)	($853)
EXCESS CAPACITY REV.										
HQIN491										
HQOUT491										
DELTA	N3									
NON-FIRM OSS REV.										
DELTA	N4									
PRODUCTION COSTS										
HQ B & C1,C2,C4	D4	$40,965	$42,926	$44,577	$46,663	$48,903	$50,763	$34,655	$36,195	$37,606
HQIN491 (MUST RUN PKR)		$205,128	$222,006	$233,131	$279,939	$294,711	$300,162	$492,973	$539,434	$577,893
HQOUT491		$213,416	$238,638	$250,239	$306,218	$336,035	$344,510	$500,067	$545,959	$590,616
DELTA		($8,288)	($16,633)	($17,108)	($26,279)	($41,324)	($44,348)	($7,094)	($6,525)	($12,723)
HQINDISP (HQ DISPATCHABLE)		$205,205	$225,925	$233,189	$279,982	$298,900	$300,170	$492,965	$539,413	$577,856
HQOUT491		$213,416	$238,638	$250,239	$306,218	$336,035	$344,510	$500,067	$545,959	$590,616
DELTA		($8,288)	($16,633)	($17,108)	($26,279)	($41,324)	($44,348)	($7,094)	($6,525)	($12,723)
HQ RPLCMNT COST – DISP	N5	$49,253	$58,559	$61,685	$72,942	$90,227	$95,131	$41,749	$42,720	$50,529
HQ PENALTY	N6	$0	$0	$0	$0	$0	$0	$0	$0	$0
COST SUMMARY										
HQ VJO CAPACITY COSTS		$38,531	$38,531	$38,531	$38,531	$38,531	$37,287	$26,068	$26,068	$21,723
COST TO REPLACE HQ VJO		($49,402)	($51,071)	($50,472)	($95,157)	($91,328)	($86,492)	($68,292)	($70,417)	($62,685)
INCREASE IN PHASE II SAVINGS		$2,034	$2,161	$2,295	$2,438	$2,589	$2,750	$2,921	$3,102	$3,295
LOST CAPACITY SALE REVENUE		$0	$0	$0	$0	$0	$0	$0	$0	$0
CHANGE TO T.BYO. EXC PH II SAVINGS		$657	$632	$608	($1,389)	($1,501)	($1,335)	($1,173)	($1,225)	($853)
CHANGE TO PRODUCTION COSTS		($8,288)	($16,633)	($17,108)	($26,279)	($41,324)	($44,348)	($7,094)	($6,525)	($12,723)
CHANGE TO NON-FIRM OSS REV		$0	$0	$0	$0	$0	$0	$0	$0	$0
NOMINAL NET SAVINGS\(INCREASES)		($15,468)	($25,381)	($25,147)	($80,856)	($92,033)	($92,138)	($47,570)	($48,996)	($51,242)
PRESENT VALUE IN '91 $'S NET SAVINGS\(INCREASES)		($3,806)	($5,865)	($5,331)	($15,726)	($16,421)	($15,083)	($7,144)	($6,751)	($6,477)
CUM PRESENT VALUE		$44,044	$38,179	$32,848	$17,122	$701	($14,382)	($21,526)	($28,277)	($34,754)

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HQ\VJO CONTRACT EVALUATION--BONN I & II, NU OFFER & GEN UNITS

24 YEAR	
BENEFIT/COST RATIO =	1.063

VARIABLES FROM ABOVE

NPV BENEFITS = N1..N5
NPV COSTS = D1..D3

1992-2015

	BENEFITS		COSTS	DELTA	CUM PV*-1
N1 =	$260,164				
N2 =	$0				
N3 =	$2,810	D1 =	$286,906		
N4 =	$4,367	D2 =	$13,906		
N5 =	$327,795	D3 =	$7,081		
N6 =	($7,928)	D4 =	$244,558		
NPV TOTAL	$587,207		$552,453	$34,754	$34,754

1.063

5 YEAR	
BENEFIT/COST RATIO =	0.657

VARIABLES FROM ABOVE

NPV BENEFITS = N1..N5
NPV COSTS = D1..D3

1992-1996

	BENEFITS		COSTS	DELTA	CUM PV*-1
N1 =	$18,214				
N2 =	$0				
N3 =	$2,810	D1 =	$63,478		
N4 =	$2,186	D2 =	$4,079		
N5 =	$54,252	D3 =	$4,229		
N6 =	($2,662)	D4 =	$42,060		
NPV TOTAL	$74,799		$113,846	($39,047)	($39,047)

0.657

10 YEAR	
BENEFIT/COST RATIO =	0.783

VARIABLES FROM ABOVE

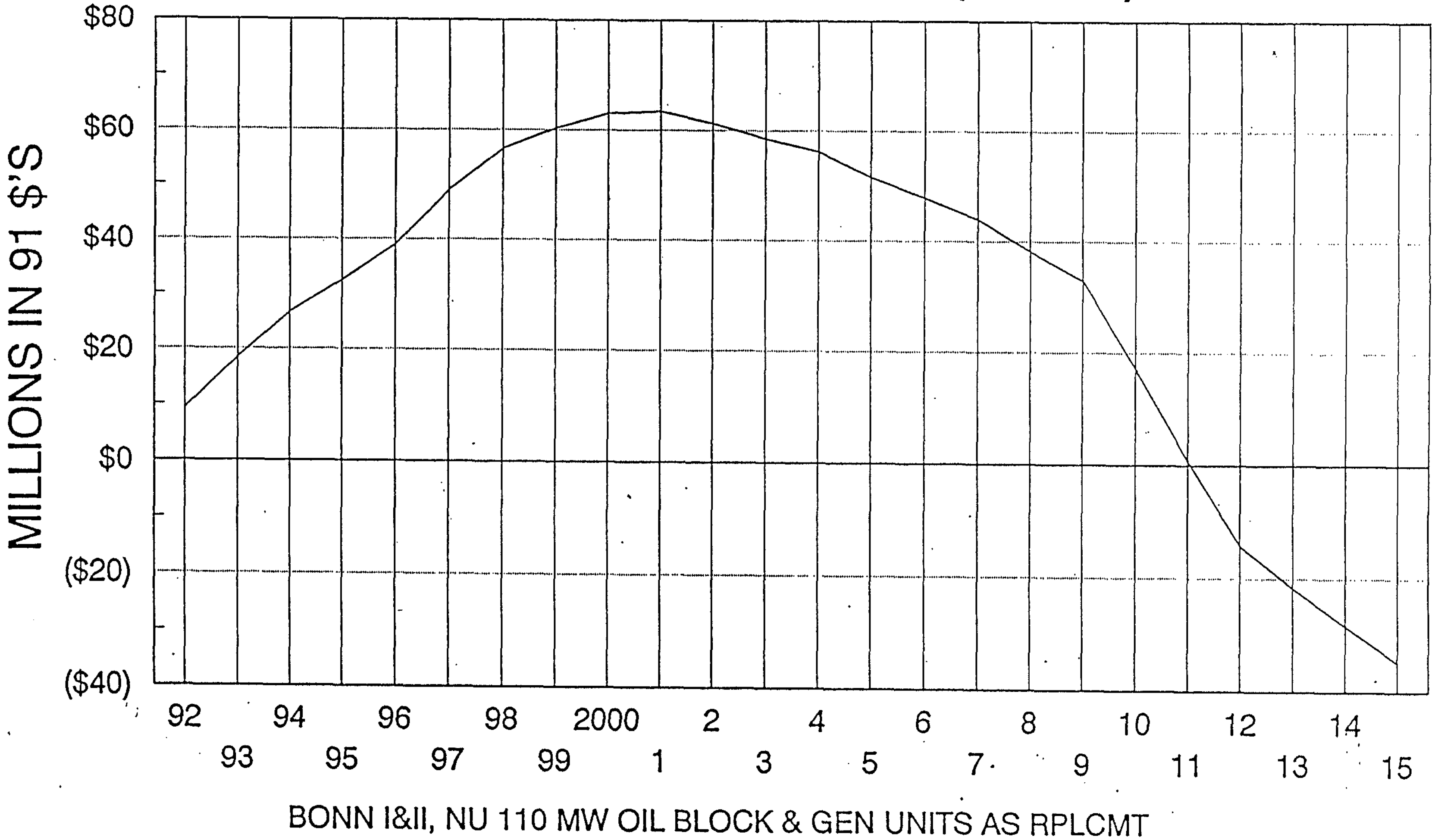
NPV BENEFITS = N1..N5
NPV COSTS = D1..D3

1992-2001

	BENEFITS		COSTS	DELTA	CUM PV*-1
N1 =	$82,431				
N2 =	$0				
N3 =	$2,810	D1 =	$163,366		
N4 =	$4,367	D2 =	$7,027		
N5 =	$147,005	D3 =	$6,639		
N6 =	($8,043)	D4 =	$114,949		
NPV TOTAL	$228,570		$292,001	($63,430)	($63,430)

0.783

CVPS RESOURCE PLANNING - HQ\VJO CONTRACT EVALUATION
CUMULATIVE PRESENT VALUE SAVINGS\(COSTS) IN 1991 $'S



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