I. INTRODUCTION

Q. PLEASE IDENTIFY YOURSELVES?

A. Patrick R. McGary of Public Utility District No. 3 of Mason County; David J. Muller of Public Utility District No. 1 of Lewis County; Gary S. Saleba of Economic and Engineering Services; and Robert K. Schneider of Public Utility District No. 1 of Snohomish County. Our qualifications are contained in Attachments 3 through 6 of WP-87-E-WA-01.

Q. ON WHOSE BEHALF ARE YOU TESTIFYING?

A. We are testifying on behalf of the eighteen utilities which comprise the Western Public Agencies Group (WPAG). These utilities provide retail electric service to over 400,000 customers in Western Washington and Oregon, and provide 30% of BPA's revenues from Northwest public utilities.

Q. HOW WOULD YOU OUTLINE THE SUBJECTS THIS TESTIMONY WILL ADDRESS?

A. The testimony will discuss the competitive energy market in the Nortwest. This will be followed by an assessment of BPA's revenue risk, and a critique of the risk package suggested by BPA. Alternative risk management proposals will be made, followed by suggestions on how the BPA revenue requirement can be lowered. Selected revenue forecasts will

Q. WHAT LOAD MANAGEMENT SYSTEM DID YOU SELECT FOR YOUR COMPARATIVE ANALYSIS?

A. The system selected for our analysis was a one-way radio controlled residential water heater load management program.

Q. HAVE OTHER UTILITY SYSTEMS UTILIZED THIS METHOD OF LOAD MANAGEMENT?

A. Yes, several utilities including Detroit Edison, American Electric Power operating companies and certain Florida utilities have successfully utilized similar load management techniques. Snohomish County PUD, Clark County PUD, Grays Harbor County PUD, the City of Canby and West Kootenay Power and Light are currently considering this type of load contrc as well.

Q. WHAT ARE THE INITIAL COSTS ASSOCIATED WITH THIS LOAD MANAGEMENT PROGRAM?

A. Attachment 6 calculates the annual cost of implementing a one-way radio controlled system on a typical large public utility located west of the Cascades. Attachments 7 and 8 take these annual costs and duplicate the BPA peak credit method utilizing the same basic methodology.

Q. HOW MUCH PEAK DEMAND REDUCTION CAN BE ACHIEVED THROUGH RESIDENTIAL WATER HEATING LOAD MANAGEMENT?

A. Our conservative estimate of potential water heating load management available through only our WPAG utilities is 200 MW. Naturally there is a larger potential load which could be subject to load management when BPA's total utility customer load is considered.

Q. DOES LOAD MANAGEMENT HAVE SUFFICIENT LOAD SHAPING CHARACTERISTICS?

A. Yes. Most system planning decisions regarding capacity are predicated on one hour system peak. Load management research indicates that the residential customer can typically be without electricity for water heating for up to 4 hours. Given these two facts, it seems that load management is a viable capacity resource alternative.

B. Energy Costs Have Been Improperly Spread to the Seasons

Q. HOW DOES BPA ALLOCATE ENERGY COSTS TO THE SEASONS?

A. Under BPA's methodology, FBS storage costs are assigned to the seasons based on use of storage energy in each season. The remaining FBS costs are allocated to the seasons based on total firm FBS energy use in each season. This results in an allocation of energy costs of 67% to winter and 33% to summer.

Q. IS THERE JUSTIFICATION FOR ADOPTING A MORE UNIFORM ENERGY CHARGE FOR THE WINTER AND SUMMER SEASONS?

UNITED STATES OF AMERICA
BEFORE THE
BONNEVILLE POWER ADMINISTRATION

Bonneville Power Administration 1985 Wholesale Power and Transmission Rates	)))	File No. WP-85

WESTERN PUBLIC AGENCIES GROUP DATA RESPONSE
TO THE BONNEVILLE POWER ADMINISTRATION

Testimony: WP-85-E-WA-01

Witness: Hutchison, Muller, Saleba, and Schneider

Question WA-6: Please provide all supporting workpapers for the 200 MW estimate made on page 38, lines 11-13.

Answer WA-6: Our estimate, as developed from survey of the WPAG utilities of residential customers with electric water heating are as follows:

Utility	Approximate # of Residential Customers With Water Heating
Clark PUD	74,500
Grays Harbor PUD	20,000
Klickitat PUD	5,600
Lewis PUD	12,000
Mason #3 PUD	12,000
Snohomish PUD	130,000
Port Angeles	7,200
Tillamook PUD	13,600
Clallam PUD	16,000
Mason #1	3,200
Skamania	3,500
Elmhurst	7,000
Canby	2,500
Parkland	3,200
Peninsula	7,500
Lakeview	N/A
Ohop	N/A
Wahkiakum	N/A
Total	317,800

Based upon the PP&L load data referenced in BPA Answer WA-4, it can be assumed that the demand per water heat at the time of system peak is likely between .7 and 1.0 KW. Thus, the 200 MW conservation estimate of reduced peak demand was derived by multiplying water heaters times estimated load.

ATTACHMENT 6

SUMMARY OF INSTALLATION & O&M COSTS FOR

ONE-WAY RADIO CONTROL WATER HEATER LOAD MANAGEMENT PROGRAM

	COSTS	QUANTITY		PRICE 1987 $S	COST
	MATERIAL COST:				
(1)	Micro Computer System	1	@	$25,000	$25,000
(2)	Remote Terminals	11	@	$20,000	$220,000
(3)	Radio Transmitters	11	@	$7,300	$80,300
(4)	Load Control Receivers	140,000	@	$95	$13,300,000
(5)	Permits	140,000	@	$25	$3,500,000
(6)	Misc. Wiring Material	140,000	@	$4	$560,000
(7)	Subtotal				$17,685,300
(8)	Sales Tax	Subtotal	@	7.80%	$1,379,453
(9)	Materials Handling	Subtotal	@	17.00%	$3,006,501
(10)	TOTAL - MATERIAL COST				$22,071,254
	INSTALLATION LABOR:				
(11)	Install Recievers	140,000	@	$70	$9,800,000
(12)	Install Transmitter hrs.	8	@	$28	$224
(13)	Install Computer hours	8	@	$28	$224
(14)	TOTAL - INSTALLATION LABOR				$9,800,448
(15)	Planning & Admin. hours	400	@	25	$10,000
(16)	TOTAL INVESTMENT (1987 $S)				$31,871,702
(17)	Amort. (int. & term)	9.00%	@	20	3,491,433
(18)	KW per unit per year				1.00
(19)	Investment/KW/year				$24.94
	O & M Investment				
(20)	Total (% of Invest.)	2.00%			$637,434
(21)	O&M/KW/year				$4.55

ATTACHMENT 7

LEVELIZED COST ANALYSIS

ONE-WAY RADIO CONTROL WATER HEATER LOAD MANAGEMENT PROGRAM

	YEAR	(A) CAPITAL INVESTMENT (nominal $s)	(B) O&M ESCALATOR (percent)	(C) O&M (nominal $s)	(D) TOTAL (nominal $s)	(E) GNP Deflator (percent)	(F) DISCOUNT STREAM	(G) DISCOUNT FACTOR	(H) DISCOUNTED TOTAL
	1987	$24.94		$4.55	***				
(1)	1988	$24.94	5.3%	$4.79	$29.73	4.70%	1.078	0.927	$27.57
(2)	1989	$24.94	5.7%	$5.07	$30.01	4.50%	1.161	0.862	$25.85
(3)	1990	$24.94	6.4%	$5.39	$30.33	4.80%	1.253	0.798	$24.21
(4)	1991	$24.94	6.3%	$5.73	$30.67	5.30%	1.359	0.736	$22.57
(5)	1992	$24.94	6.3%	$6.09	$31.03	5.30%	1.474	0.678	$21.05
(6)	1993	$24.94	6.3%	$6.48	$31.42	5.40%	1.600	0.625	$19.63
(7)	1994	$24.94	6.5%	$6.90	$31.84	5.50%	1.739	0.575	$18.31
(8)	1995	$24.94	6.4%	$7.34	$32.28	5.50%	1.889	0.529	$17.08
(9)	1996	$24.94	6.6%	$7.82	$32.76	5.50%	2.053	0.487	$15.96
(10)	1997	$24.94	6.9%	$8.36	$33.30	5.50%	2.231	0.448	$14.93
(11)	1998	$24.94	6.9%	$8.94	$33.88	5.60%	2.427	0.412	$13.96
(12)	1999	$24.94	7.0%	$9.57	$34.51	5.60%	2.639	0.379	$13.07
(13)	2000	$24.94	7.0%	$10.24	$35.17	5.80%	2.876	0.348	$12.23
(14)	2001	$24.94	7.0%	$10.95	$35.89	5.70%	3.131	0.319	$11.46
(15)	2002	$24.94	7.0%	$11.72	$36.66	5.80%	3.412	0.293	$10.74
(16)	2003	$24.94	7.0%	$12.54	$37.48	5.80%	3.719	0.269	$10.08
(17)	2004	$24.94	7.0%	$13.42	$38.36	5.60%	4.045	0.247	$9.48
(18)	2005	$24.94	7.0%	$14.36	$39.30	5.60%	4.399	0.227	$8.93
(19)	2006	$24.94	7.0%	$15.36	$40.30	5.60%	4.785	0.209	$8.42
(20)	2007	$24.94	7.0%	$16.44	$41.38	5.60%	5.205	0.192	$7.95
									$313.50

(I) LEVELIZED AT 3% REAL FOR 20 YEARS : 0.0672 TIMES $313.50 = $21.07

COLUMNS: SOURCES:

(A) LINE 19 OF ATTACHMENT 1

(B) COLUMN C , TABLE 1-7 , DRI O&M ESCALATOR , P. 10 OF WP-87-E-BPA-04A, 1987 MARGINAL COST DOCUMENTATION

(C) CALCULATED NOMINAL O&M $/KW USING CURRENT YEAR ESCALATOR AND PREVIOUS YEARS $O&M/KW; 1987 $/KW FROM LINE 21 OF ATTACHMENT 1

(D) TOTAL LOAD CONROL PROGRAM NOMINAL $/KW; COLUMNS A + C

(E) COLUMN B , TABLE 1-7 , DRI GNP DEFLATOR , P. 10 OF WP-87-E-BPA-04A, 1987 MARGINAL COST DOCUMENTATION

(F) COLUMN C , TABLE 1-8 , P. 11 OF WP-87-E-BPA-04A, 1987 MARGINAL COST DOCUMENTATION

(G) COLUMN D , TABLE 1-8 , P. 11 OF WP-87-E-BPA-04A, 1987 MARGINAL COST DOCUMENTATION

(H) COLUMN G TIMES D

(I) TABLE 1-4 & TABLE 1-6.7 , COST OF CAPITAL USE , PPS. 6 & 9 OF WP-87-E-BPA-04A.

ATTACHMENT 8

MARGINAL COST AND CAPACITY ANALYSIS

ONE-WAY RADIO CONTROL WATER HEATER LOAD MANAGEMENT PROGRAM

1.	Let X be the Levelized Annual Marginal Cost ($/KW)	$128.56
2.	Let Y be the Levelized LC Fixed annual cost ($/KW)	$21.07
3.	Let Z be the Levelized LC Variable Cost (mills/kwh)	0
4.	Let a be the LC Capacity Factor	0
5.	Let b be the Average System Plant Factor.	0.553
6.	Let c be the LC Reserve Factor	0.95
7.	Let E be the Marginal Cost of energy (mills/kwh).	
8.	Let C be the Marginal Cost of capacity	

9. LC = One Way Water Heater Load Control

10. C = (aX - bY - abZ(8.76))/(a - bc)

11. E = (X - C)/(b(8.76))

12. $22.18 per KW = C ; implies a 17.2% allocation to capacity

13. 21.96 mills/kwh = E ; implies a 82.8% allocation to energy

LINE: SOURCE:

A11 GENRAL STRUCTURE FROM TABLE 1, P 2 OF WP-87-E-BPA-04A, 1987 MARGINAL COST DOCUMENTATION

1 LINE 1 FROM TABLE 1, P 2 OF WP-87-E-BPA-04A, 1987 MARGINAL COST DOCUMENTATION

2 LINE I , ATTACHMENT 2

3 NONE - NO FUEL OR OTHER VARIABLE COSTS BY LOAD CONTROL

4 0 - NO ENERGY PRODUCED BY LOAD CONTROL

5 LINE 5 FROM TABLE 1, P 2 OF WP-87-E-BPA-04A, 1987 MARGINAL COST DOCUMENTATION

6 LINE 6 FROM Detroit Edison experience

7-13 GENRAL STRUCTURE FROM TABLE 1, P 2 OF WP-87-E-BPA-04A, 1987 MARGINAL COST DOCUMENTATION