

**Prepared by**

**BONNEVILLE POWER ADMINISTRATION**

**DEPARTMENT OF ENERGY**

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**FOR**

**INITIAL REVENUE REQUIREMENT STUDY**

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## COMMONLY USED ACRONYMS

AC	Alternating Current
ACS	Ancillary Services and Control Area Services (Rate)
AF	Advance Funding (Rate)
AFUDC	Allowance for Funds Used During Construction
AGC	Automatic Generation Control
aMW	Average Megawatt
ASC	Average System Cost
BOR	U.S. Bureau of Reclamation
BPA	Bonneville Power Administration
Btu	British Thermal Unit
CA	Control Area
CAISO	California Independent System Operator
California PX	California Power Exchange
CAS	Control Area Service
COB	California-Oregon Border
COE	U.S. Army Corps of Engineers
CPTC	Columbia Power Trades Council
CRAC	Cost Recovery Adjustment Clause
CSL	Customer-Served Load
CY	Calendar Year (Jan-Dec)
DC	Direct Current
DOE	Department of Energy
DOI	Department of Interior
DSIs	Direct Service Industrial Customers
EIA	Energy Information Administration
Energy Northwest	Formerly Washington Public Power Supply System Project
F&O	Financial and Operating Reports
FCCF	Fish Cost Contingency Fund
FCRPS	Federal Columbia River Power System
FCRTS	Federal Columbia River Transmission System
FERC	Federal Energy Regulatory Commission
FPT	Formula Power Transmission Rate
FTE	Full-time Equivalent
FY	Fiscal Year (Oct-Sep)
GDP	Gross Domestic Product
GI	Generation Integration
GRSPs	General Rate Schedule Provisions
GSU	Generator Step-Up Transformers
GTA	General Transfer Agreement
GWh	Gigawatthour
HLH	Heavy Load Hours
HNF	Hourly Non-Firm
IDC	Interest During Construction
IE	Eastern Intertie (Rate)

IM	Montana Intertie (Rate)
IOUs	Investor-Owned Utilities
IP	Industrial Firm Power (Rate)
IR	Integration of Resources (Rate)
IS	Southern Intertie (Rate)
ISC	Investment Service Coverage
ISO	Independent System Operator
kcf <sup>s</sup>	kilo (thousands) of cubic feet per second
kV	Kilovolt (1000 volts)
kVAr	Kilovoltampere Reactive
kW	Kilowatt (1000 watts)
kWh	Kilowatthour
LLH	Light Load Hours
m/kWh	Mills per kilowatthour
MAF	Million Acre Feet
MORC	Minimum Operating Reliability Criteria
MTPL	Monthly Transmission Peak Load
MW	Megawatt (1 million watts)
MWh	Megawatthour
NCD	Network Contract Demand (Service and Rate)
NERC	North American Electric Reliability Council
NF	Nonfirm Energy
NOB	Nevada-Oregon Border
NORM	Non-Operating Risk Model
Northwest Power Act	Pacific Northwest Electric Power Planning and Conservation Act
NT	Network Integration Transmission (Service and Rate)
NTSA	Non-Treaty Storage Agreement
NWPP	Northwest Power Pool
NWPPC	Northwest Power Planning Council
O&M	Operation and Maintenance
OASIS	Open Access Same-Time Information System
OATT	Open Access Transmission Tariff
OMB	Office of Management and Budget
OY	Operating Year (Aug-Jul)
PA	Public Agency
PBL	Power Business Line
PNCA	Pacific Northwest Coordination Agreement
PNRR	Planned Net Revenues for Risk
PNUCC	Pacific Northwest Utilities Conference Committee
PNW	Pacific Northwest
POD	Point of Delivery
POI	Point of Integration (or, Interconnection)
POR	Point of Receipt
PSW	Pacific Southwest
PTP	Point to Point (Service and Rate)
PUD	Public or People's Utility District

Reclamation	Bureau of Reclamation
RiskMod	Risk Analysis Model (computer model)
RiskSim	Risk Simulation Model
RMS	Remote Metering System
ROD	Record of Decision
RPSA	Residential Purchase Sale Agreement
RRS	Revenue Requirement Study
RTO	Regional Transmission Organization
SCADA	Supervisory Control And Data Acquisition System
Tariff	Open Access Transmission Tariff
TBL	Transmission Business Line
TCH	Transmission Contract Holder
TGT	Townsend-Garrison Transmission (Rate)
TPP	Treasury Payment Probability
TRAP	Transmission Risk Analysis Processor
TRS	Transmission Rate Study
TTSL	Total Transmission System Loading
UIC	Unauthorized Increase Charge
UFT	Use of Facilities (Rate)
USBOR	U.S. Bureau of Reclamation
VOR	Value of Reserves
WEFA	Wharton Econometric Forecasting Associates
WSCC	Western Systems Coordinating Council
WSPP	Western System Power Pool
1CP	One Coincidental Peak
12CP	Twelve Coincidental Peak



## **CHAPTER 1**

### **TRANSMISSION REVENUE REQUIREMENTS**

#### **I. Introduction**

This chapter documents how Bonneville Power Administration's (BPA) annual transmission revenue requirements are determined. Two tables are presented showing both years of the rate period (FYs 2002 and 2003). On the first table, revenue requirements for FYs 2002 and 2003 are projected in an income statement format. The second table, a statement of annual cash flows, determines the minimum required net revenues and presents the annual cash flows available for risk mitigation.

#### **II. Income Statement**

A more detailed description of the following line items is presented in Chapter 4 of the Revenue Requirement Study (Study) (TR-02-E-BPA-01). Operating expenses (lines 1-5) include: BPA's transmission system operation, maintenance and development expenses, environmental remediation, facility leases, non-Federal transmission arrangements, transmission marketing and scheduling, transmission business line support services and overheads, and corporate overheads (line 2); inter-business lines expenses (primarily the generation inputs for ancillary services) (line 3), and annual straight-line depreciation (remaining life technique) for transmission and general plant-in-service (line 4).

Federal interest expense is calculated in transmission repayment studies on appropriations granted by Congress for BPA capital investments prior to the Transmission Act (line 8) and on bonds that BPA issues to the U.S. Treasury (line 9). Amortization of capitalized bond premiums (line 11) is the annual amortization of call premiums resulting from early retirement of bonds that have been refinanced. The call premiums are capitalized and included in the principal of the replacement bonds. They are then amortized over the term of the respective replacement

bonds and constitute a non-cash component of interest expense. Bond interest is reduced by interest income from BPA's projected cash reserves (line 10). The capitalization adjustment and the Allowance for Funds Used During Construction (AFUDC) (lines 22-23) further reduce gross interest expense. The capitalization adjustment, a non-cash expense, is the annual recognition of the write-down in principal that resulted from the BPA Appropriations Refinancing Act.

Planned net revenues (lines 16-18) are included to ensure coverage of planned amortization payments (minimum required net revenues) and to meet the Administrator's risk mitigation policy (planned net revenues for risk). *See Chapter 9 of this volume and Section 2.2 of the Revenue Requirement Study TR-02-E-BPA-01.*

### **III. Statement of Cash Flows**

- ***Cash from Current Operations:*** Minimum required net revenues (line 2) is the amount necessary to ensure that cash from operations is sufficient for planned amortization payments. It is the amount by which these planned payments to the U.S. Treasury exceed the expenses that do not require cash outlays (depreciation [line 4], amortization of capitalized bond premiums [line 5] and the capitalization adjustment [line 6]) and the revenues that do not provide cash in that year (accrual revenues from AC Intertie capacity ownership and fiber optic cable leases [line 7]).
- ***Cash Used for Capital Investments:*** Investment in utility plant (line 11) is the increase in capital outlays associated with BPA investments for transmission, environment and general plant assets.
- ***Cash from Treasury Borrowing and Appropriations:*** Increase in long-term debt (line 14) is the annual increment in bonds that BPA issues to Treasury to fund capital outlays for

transmission, environment and general plant assets. Repayment of long-term debt (line 15) is planned amortization of bonds issued to Treasury, as determined in transmission repayment studies. Repayment of capital appropriations (line 16) is planned amortization associated with pre-Transmission Act appropriations, as determined in transmission repayment studies.

**TRANSMISSION REVENUE REQUIREMENT**  
**INCOME STATEMENT**  
(\$thousands)

	A FY 2002	B FY 2003	C AVERAGE
<b>1 OPERATING EXPENSES</b>			
2 OPERATION AND MAINTENANCE	238,071	232,195	235,133
3 INTER-BUSINESS LINE EXPENSES	84,276	84,243	84,260
4 FEDERAL PROJECTS DEPRECIATION	182,694	195,358	189,026
<b>5 TOTAL OPERATING EXPENSES</b>	<b>505,041</b>	<b>511,796</b>	<b>508,419</b>
<b>6 INTEREST EXPENSE</b>			
7 INTEREST ON FEDERAL INVESTMENT -			
8 ON APPROPRIATED FUNDS	66,904	65,280	66,092
9 ON LONG-TERM DEBT	143,126	143,418	143,272
10 INTEREST CREDIT ON CASH RESERVES	(5,707)	(7,649)	(6,678)
11 AMORTIZATION OF CAPITALIZED BOND PREMIUMS	3,220	3,220	3,220
12 CAPITALIZATION ADJUSTMENT	(19,618)	(20,174)	(19,896)
13 AFUDC	(5,040)	(5,225)	(5,133)
<b>14 NET INTEREST EXPENSE</b>	<b>182,885</b>	<b>178,870</b>	<b>180,877</b>
<b>15 TOTAL EXPENSES</b>	<b>687,926</b>	<b>690,666</b>	<b>689,296</b>
<b>16 MINIMUM REQUIRED NET REVENUES 1/</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>17 PLANNED NET REVENUES FOR RISK</b>	<b>10,751</b>	<b>9,829</b>	<b>10,290</b>
<b>18 TOTAL PLANNED NET REVENUES</b>	<b>10,751</b>	<b>9,829</b>	<b>10,290</b>
<b>17 TOTAL REVENUE REQUIREMENT</b>	<b>698,677</b>	<b>700,495</b>	<b>699,586</b>

1/ SEE NOTE ON CASH FLOW TABLE.

**TRANSMISSION REVENUE REQUIREMENT**  
**STATEMENT OF CASH FLOWS**  
(\$thousands)

	A FY 2002	B FY 2003
1 CASH FROM CURRENT OPERATIONS:		
2 MINIMUM REQUIRED NET REVENUES 1/	0	0
3 EXPENSES NOT REQUIRING CASH:		
4 FEDERAL PROJECTS DEPRECIATION	182,694	195,358
5 AMORTIZATION OF CAPITALIZED BOND PREMIUMS	3,220	3,220
6 CAPITALIZATION ADJUSTMENT	(19,618)	(20,174)
7 ACCRUAL REVENUES (AC INTERTIE/FIBER)	(4,031)	(4,031)
8 CASH PROVIDED BY CURRENT OPERATIONS	162,265	174,373
9 CASH USED FOR CAPITAL INVESTMENTS:		
10 INVESTMENT IN:		
11 UTILITY PLANT	(252,300)	(248,416)
12 CASH USED FOR CAPITAL INVESTMENTS	(252,300)	(248,416)
13 CASH FROM TREASURY BORROWING AND APPROPRIATIONS:		
14 INCREASE IN LONG-TERM DEBT	252,300	248,416
15 REPAYMENT OF LONG-TERM DEBT	(124,226)	(124,233)
16 REPAYMENT OF CAPITAL APPROPRIATIONS	(23,913)	(26,247)
17 CASH FROM TREASURY BORROWING AND APPROPRIATIONS	104,161	97,936
18 ANNUAL INCREASE (DECREASE) IN CASH	14,126	23,893
19 PLANNED NET REVENUES FOR RISK	10,751	9,829
20 TOTAL ANNUAL INCREASE (DECREASE) IN CASH	24,877	33,722

1/ Line 18 must be greater than or equal to zero, otherwise net revenues will be added so that there are no negative cash flows for the year.



## **CHAPTER 2**

### **SEGMENTATION OF TRANSMISSION REVENUE REQUIREMENT**

#### **I. Introduction**

This chapter documents how the components of the transmission revenue requirements are segmented in order to identify the cost of each transmission and ancillary service provided by the FCRTS.

#### **II. Segmentation**

##### ***Operations & Maintenance (O&M)***

BPA transmission O&M (*see Chapter 3 - Transmission Expenses*) is segmented in three steps.

Step 1, direct assignment: the generation inputs to ancillary services, COE and BOR transmission costs, ancillary services O&M, leases, GTAs (non-Federal transmission arrangements) and remedial action schemes (RAS) are assigned to segments and ancillary services as appropriate.

The bases for these assignments are made by staff supporting the respective areas, except for COE and BOR costs, which are segmented based on the same method used in the power rate case to quantify the total amount of these charges. O&M is based on average gross investment. Depreciation is calculated from the specific Network and Utility Delivery investment, and interest is based on average net plant.

Step 2, three-year averages of historical data: the transmission system operations (less the directly-assigned amount for ancillary services) and maintenance and environmental remediation programs are divided between lines and substations according to a 3-year historical average of that split. The costs are then separately segmented for lines and substations based on the

respective 3-year averages of historical O&M. See Segmentation Study, TR-02-E-BPA-02, Table D.

Step 3, sum of previously-segmented non-payment related O&M: the classification of ancillary services O&M in step 1 and transmission O&M in step 2 are summed in order to provide the pro rata basis for the segmentation of all remaining O&M costs. Station service is segmented by the 3-year historical averages of O&M for substations by segment.

### ***Depreciation***

BPA depreciation is segmented in three steps. In the first step, BPA transmission depreciation is calculated for each segment and ancillary service from the gross investment (*see Chapter 4 - FCRTS Investment Base*). In the second step, transmission depreciation for control equipment and communications equipment is pro rated to the segments based on their depreciation expense. In the third step, the remaining general plant depreciation is prorated to the segments and ancillary services based on the total of the above steps.

### ***Net Interest Expense and Planned Net Revenues***

The transmission net interest expense (line 14, Transmission Revenue Requirement) and the planned net revenues (line 18) are prorated to the segments and ancillary services based on the average net plant investment in those areas (*see Chapter 4*). The Southern Intertie net plant is adjusted to remove the balance of the unearned revenues associated with non-Federal capacity ownership. Similarly, the unearned revenue balance associated with prepaid fiber optic leases is segmented pro rata based on the disposition of communications plant in each segment to reduce net plant. Interest credits for the Utility and DSI Delivery segments were applied directly to those segments prior to the segmentation of the remainder of net interest expense.

**SEGMENTED TRANSMISSION REVENUE REQUIREMENTS**  
(\$thousands)

	A	B	C	D	E	F	G	H
	TOTAL	GI	NETWORK	SOUTH INTER	EAST INTER	UTIL DELIV	DSI	ANCILL SERV
<b>FY 2002</b>								
1 Operations & Maintenance	238,071	2,399	158,803	25,165	2,019	4,529	2,521	42,635
2 Inter-Business Line Expenses	84,276	29	4,689	608	8	317	53	78,572
3 Depreciation	182,694	2,447	120,424	26,717	4,127	2,688	2,433	23,858
4 Net Interest Expense	182,885	2,966	132,609	24,810	4,764	2,936	2,533	12,267
5 Planned Net Revenues	10,751	174	7,763	1,453	279	194	170	718
6 Total Transmission Rev Req	698,677	8,015	424,288	78,753	11,197	10,664	7,710	158,050
<b>FY 2003</b>								
1 Operations & Maintenance	232,195	2,340	155,021	24,529	1,966	4,416	2,456	41,467
2 Inter-Business Line Expenses	84,243	29	4,654	608	8	319	53	78,572
3 Depreciation	195,358	2,527	129,490	27,478	4,239	2,819	2,560	26,245
4 Net Interest Expense	178,870	2,746	132,050	22,747	4,370	2,767	2,396	11,794
5 Planned Net Revenues	9,829	150	7,226	1,245	239	172	152	645
6 Total Transmission Rev Req	700,495	7,792	428,441	76,607	10,822	10,493	7,617	158,723

**REVENUE REQUIREMENTS FOR ANCILLARY SERVICES**  
 (\$in thousands)

	A Total Ancillary Services	B Scheduling, Syst Control, & Dispatch	C Reactive Supply & Volt Control	D Regulation & Freqncy Response	E Energy Imbalance	F Op Resrv Spinning	G Op Resrv Supplmtl
<b>FY 2002</b>							
1 Direct O&M	20,044	18,725	412	845	0	31	31
2 Overheads	22,591	21,105	464	952	0	35	35
3 Total O&M	42,635	39,830	876	1,797	0	66	66
4 Generation Inputs	78,572	0	29,278	11,980	0	18,657	18,657
5 Depreciation	23,858	20,783	602	2,072	0	204	197
6 Net Interest	12,267	10,636	307	1,139	0	95	90
7 Planned NR	718	622	18	67	0	6	5
8 Total Rev Req	158,050	71,871	31,081	17,055	0	19,028	19,015
1 Direct O&M	20,645	19,287	424	870	0	32	32
2 Overheads	20,822	19,453	428	877	0	32	32
3 Total O&M	41,467	38,740	852	1,747	0	64	64
4 Generation Inputs	78,572	0	29,278	11,980	0	18,657	18,657
5 Depreciation	26,245	22,814	662	2,321	0	228	220
6 Net Interest	11,794	10,226	295	1,095	0	91	87
7 Planned NR	645	559	16	60	0	5	5
8 Total Rev Req	158,723	72,339	31,103	17,203	0	19,045	19,033

**REVENUE REQUIREMENTS FOR ANCILLARY SERVICES**  
 (\$in thousands)

	A Total Ancillary Services	B Scheduling, Syst Control, & Dispatch	C Reactive Supply & Volt Control	D Regulation & Freqncy Response	E Energy Imbalance	F Op Resrv Spinning	G Op Resrv Supplmtl
<b>FY 2002</b>							
1 INVESTMENT BASE	194,943	169,008	4,883	18,107	0	1,507	1,438
2 PERCENT	100%	86.7%	2.5%	9.3%	0.0%	0.8%	0.7%
3 NET INTEREST	12,267	10,636	307	1,139	0	95	90
4 PLANNED NET REVENUES	718	622	18	67	0	6	5
5 DEPRECIATION	20,848	18,161	526	1,811	0	178	172
6 PERCENT	100%	87.1%	2.5%	8.7%	0.0%	0.9%	0.8%
7 GP DEPRECIATION	3,010	2,622	76	261	0	26	25
8 TOTAL DEPRECIATION	23,858	20,783	602	2,072	0	204	197
<b>FY 2003</b>							
9 INVESTMENT BASE	196,249	169,438	4,927	18,872	0	1,537	1,475
10 PERCENT	100%	86.3%	2.5%	9.6%	0.0%	0.8%	0.8%
11 NET INTEREST	11,794	10,226	295	1,095	0	91	87
12 PLANNED NET REVENUES	645	559	16	60	0	5	5
13 DEPRECIATION	22,476	19,538	567	1,988	0	195	188
14 PERCENT	100%	86.9%	2.5%	8.8%	0.0%	0.9%	0.8%
15 GP DEPRECIATION	3,769	3,276	95	333	0	33	32
16 TOTAL DEPRECIATION	26,245	22,814	662	2,321	0	228	220

**SEGMENTATION OF TRANSMISSION REVENUE REQUIREMENT (\$000)**

FY 2002	TOTAL	GI	NETWORK	SOUTH INTER	EAST INTER	UTIL DELIV	DSI	ANCILL SERV
1 INVESTMENT BASE	3,084,547	49,815	2,227,434	416,739	80,021	55,629	48,859	206,050
2 percent	100%	1.61%	72.21%	13.51%	2.59%	1.80%	1.58%	6.68%
3 Interest Credit from Facilities Sale	(752)					(376)	(376)	
4 NET INTEREST	183,637	2,966	132,609	24,810	4,764	3,312	2,909	12,267
5 NET REVENUES	10,751	174	7,763	1,453	279	194	170	718
6 DEPRECIATION	115,770	1,783	87,774	19,473	3,008	1,959	1,773	20,848
7 percent	100%	1.54%	75.82%	16.82%	2.60%	1.69%	1.53%	
8 TX GP DEPRECIATION	23,026	355	17,457	3,873	598	390	353	
9 subtotal	159,644	2,138	105,231	23,346	3,606	2,349	2,126	20,848
10 percent	100%	1.34%	65.92%	14.62%	2.26%	1.47%	1.33%	13.06%
11 REMAINING GP DEPR	23,050	309	15,193	3,371	521	339	307	3,010
12 TOTAL DEPR	182,694	2,447	120,424	26,717	4,127	2,688	2,433	23,858
1 DIRECT ASSIGNMENT:								
2 GENERATION INPUTS	78,572							78,572
3 COE/BOR TRANSMISSION	3,750		3,526			224		
4 STABILITY RESERVES	0							
5 ANCILLARY SERVICES O&M	20,044							20,044
6 LEASES	5,267		5,188			79		
7 GTAs	4,365		4,365					
8 TOTAL O&M DIRECT ASSIGN	29,676	0	9,553	0	0	79	0	20,044
9 3-YR AVG O&M: LINES	58,330	578	52,801	4,023	924	4	0	
10 3-YR AVG O&M: SUBS	46,529	777	31,427	10,180	215	2,508	1,422	
11 TOTAL 3-YR AVG	104,859							
12 SYS OP, SYS MNT, ENV	87,352							
13 DIRECT LINES O&M	48,591	481	43,986	3,351	770	3		
14 DIRECT SUBS O&M	38,761	647	26,181	8,480	179	2,089	1,185	
15 TOTAL DIRECT TRANS O&M	87,352	1,128	70,167	11,831	949	2,092	1,185	
16 TOTAL DIRECT O&M	107,396	1,128	70,167	11,831	949	2,092	1,185	20,044
17 OVERHEAD CATEGORIES	121,043	1,271	79,083	13,334	1,070	2,358	1,336	22,591
18 TOTAL O&M	238,071	2,399	158,803	25,165	2,019	4,529	2,521	42,635
19 STATION SERVICE	1,723	29	1,163	377	8	93	53	
20 RAS	231	0	0	231	0	0	0	
21 TOTAL INTERBUSINESS LINE	84,276	29	4,689	608	8	317	53	78,572

**SEGMENTATION OF TRANSMISSION REVENUE REQUIREMENT (\$000)**

FY 2003	TOTAL	GI	NETWORK	SOUTH INTER	EAST INTER	UTIL DELIV	DSI	ANCILL SERV
1 INVESTMENT BASE	3,147,250	48,108	2,313,749	398,558	76,568	55,059	48,557	206,651
2 percent	100%	1.53%	73.52%	12.66%	2.43%	1.75%	1.54%	6.57%
3	(750)					(375)	(375)	
4 NET INTEREST	179,620	2,746	132,050	22,747	4,370	3,142	2,771	11,794
5 NET REVENUES	9,829	150	7,226	1,245	239	172	152	645
DEPRECIATION	120,645	1,803	92,378	19,603	3,024	2,011	1,826	22,476
6 percent	100%	1.49%	76.57%	16.25%	2.51%	1.67%	1.51%	
7 TX GP DEPRECIATION	24,180	361	18,515	3,929	606	403	366	
8 subtotal	144,825	2,164	110,893	23,532	3,630	2,414	2,192	22,476
9 percent	100%	1.49%	76.57%	16.25%	2.51%	1.67%	1.51%	15.52%
10 REMAINING GP DEPR	24,288	363	18,597	3,946	609	405	368	3,769
11 TOTAL DEPR	195,358	2,527	129,490	27,478	4,239	2,819	2,560	26,245
1 DIRECT ASSIGNMENT:								
2 GENERATION INPUTS	78,572							78,572
3 COE/BOR TRANSMISSION	3,717		3,491				226	
4 STABILITY RESERVES	0							
5 ANCILLARY SERVICES O&M	20,645							20,645
6 LEASES	5,267		5,188				79	
7 GTAs	4,365		4,365					
8 TOTAL O&M DIRECT ASSIGN	30,277	0	9,553	0	0	79	0	20,645
9 3-YR AVG O&M: LINES	58,330	578	52,801	4,023	924	4	0	
10 3-YR AVG O&M: SUBS	46,529	777	31,427	10,180	215	2,508	1,422	
11 TOTAL 3-YR AVG	104,859							
12 SYS OP, SYS MNT, ENV	90,161							
13 DIRECT LINES O&M	50,154	497	45,401	3,459	794	3	0	
14 DIRECT SUBS O&M	40,007	668	27,022	8,753	185	2,156	1,223	
15 TOTAL DIRECT TRANS O&M	90,161	1,165	72,423	12,212	979	2,159	1,223	
16 TOTAL DIRECT O&M	110,806	1,165	72,423	12,212	979	2,159	1,223	20,645
17 OVERHEAD CATEGORIES	111,757	1,175	73,045	12,317	987	2,178	1,233	20,822
18 TOTAL O&M	232,195	2,340	155,021	24,529	1,966	4,416	2,456	41,467
19 STATION SERVICE	1,723	29	1,163	377	8	93	53	
20 RAS	231	0	0	231	0	0	0	
21 TOTAL INTERBUSINESS LINE	84,243	29	4,654	608	8	319	53	78,572

## BPA TRANSMISSION PLANT: ALLOCATION OF GENERAL PLANT INVESTMENT (\$000)

		A	B	C	E	F	G	H
<b>FY 2002</b>		<b>GENER INTEG</b>	<b>NETWORK</b>	<b>SOUTH INTER</b>	<b>EAST INTER</b>	<b>UTIL DELIV</b>	<b>DSI</b>	<b>ANCILL SERV</b>
1	NET TRANSMISSION PLANT	2,459,021	40,732	1,821,308	446,113	65,431	45,486	39,951
2	PERCENT	100%	1.66%	74.07%	18.14%	2.66%	1.85%	1.62%
3	TRANS GP: 353 and 397	318,471	5,275	235,880	57,777	8,474	5,891	5,174
4	SUBTOTAL PLANT	2,972,435	46,007	2,057,188	503,890	73,905	51,377	45,125
5	PERCENT	100%	1.55%	69.21%	16.95%	2.49%	1.73%	1.52%
6	REMAINING GEN PLANT	253,562	3,925	175,487	42,984	6,304	4,383	3,849
7	ACC REV BAL ADJ - Fiber	(12,599)	(117)	(5,241)	(1,284)	(188)	(131)	(115)
8	ACC REV BAL ADJ - 3AC	(128,851)			(128,851)			(5,523)
9	INVESTMENT BASE	2,583,732	49,815	2,227,434	416,739	80,021	55,629	48,859
<b>FY 2003</b>								
10	NET TRANSMISSION PLANT	2,522,507	39,579	1,903,531	431,159	62,993	45,297	39,948
11	PERCENT	100%	1.57%	75.46%	17.09%	2.50%	1.80%	1.58%
12	TRANS GP: 353 and 397	323,759	5,080	244,315	55,338	8,085	5,814	5,127
13	SUBTOTAL PLANT	3,042,515	44,659	2,147,846	486,497	71,078	51,111	45,075
14	PERCENT	100%	1.47%	70.59%	15.99%	2.34%	1.68%	1.48%
15	GENERAL PLANT	242,155	3,554	170,948	38,720	5,657	4,068	3,588
16	ACC REV BAL ADJ - Fiber	(11,904)	(105)	(5,045)	(1,143)	(167)	(120)	(106)
17	ACC REV BAL ADJ - 3AC	(125,516)			(125,516)			(5,218)
18	INVESTMENT BASE	2,639,146	48,108	2,313,749	398,558	76,568	55,059	48,557

**Transmission Accrual Revenues**  
**Unearned Revenue Balances**  
(\$000)

**Intertie Capacity Ownership**

	Annual Write-Down	Unearned Balance	Average Unearned Balance
1999	3,335	137,188	
2000	3,335	133,853	
2001	3,335	130,518	
2002	3,335	127,183	128,851
2003	3,335	123,848	125,516

**Fiber Optic Leases**

	Beginning Balance	Annual Write-Down	Cumulative Write-Down	Unearned Balance	Average Unearned Balance
1999	3,104	235	235	2,869	
2000	14,354	685	920	13,434	
2001	14,563	696	1,616	12,947	
2002	14,563	696	2,312	12,251	12,599
2003	14,563	696	3,008	11,555	11,903

COE/BOR ANNUAL COSTS  
(\$000)

		AVG 2002		AVG 2003		2002	
		INVEST	PERCENT	O&M	INVEST	PERCENT	O&M
<b>1 BONNEVILLE</b>							
<b>2 NETWORK</b>		885	100%	13	885	100%	13
<b>3 TOTAL</b>		885	100%	13	885	100%	13
<b>4 COLUMBIA BASIN</b>							
<b>5 NETWORK</b>		42,963	97%	1,272	42,963	97%	1,277
<b>6 DELIVERY</b>		1,147	3%	34	1,147	3%	34
<b>7 TOTAL</b>		44,110	100%	1,306	44,110	100%	1,311
<b>8 HUNGRY HORSE</b>							
<b>9 NETWORK</b>		2,488	100%	46	2,488	100%	45
<b>10 TOTAL</b>		2,488	100%	46	2,488	100%	45
<b>11 MINIDOKA-PALISADES</b>							
<b>12 NETWORK</b>		1,281	76%	419	1,281	76%	433
<b>13 DELIVERY</b>		398	24%	130	398	24%	134
<b>14 TOTAL</b>		1,679	100%	549	1,679	100%	567
<b>15 NETWORK</b>				1,750			1,768
<b>16 DELIVERY</b>				164			168
<b>17 TOTAL TRANSMISSION</b>				1,914			1,936

	FY 2002				FY 2003			
	O&M	DEPR	INTEREST	TOTAL	O&M	DEPR	INTEREST	TOTAL
<b>NETWORK</b>	1,750	687	1,089	<b>3,526</b>	1,768	687	1,036	<b>3,491</b>
<b>DELIVERY</b>	164	22	38	<b>224</b>	168	22	36	<b>226</b>
<b>TOTAL TRANSMISSION</b>	1,914	709	1,127	3,750	1,936	709	1,072	3,717

COE/BOR ANNUAL COSTS  
(\$000)

	Y TOTAL DEPR EXP	Z 2002 ACCUM DEPR	AA INVESTMENT 9/30/02	AE TOTAL DEPR EXP	AF 2003 ACCUM DEPR	AG INVESTMENT 9/30/03
<b>1 BONNEVILLE</b>						
<b>2 NETWORK</b>	0	885	885	0	885	885
<b>3 TOTAL</b>	0	885	885	0	885	885
<b>4 COLUMBIA BASIN</b>						
<b>5 NETWORK</b>	633	13,699	42,963	633	14,332	42,963
<b>6 DELIVERY</b>	17	366	1,147	17	383	1,147
<b>7 TOTAL</b>	650	14,065	44,110	650	14,715	44,110
<b>8 HUNGRY HORSE</b>						
<b>9 NETWORK</b>	28	994	2,488	28	1,022	2,488
<b>10 TOTAL</b>	28	994	2,488	28	1,022	2,488
<b>11 MINIDOKA-PALISADES</b>						
<b>12 NETWORK</b>	15	250	1,281	15	265	1,281
<b>13 DELIVERY</b>	5	79	398	5	84	398
<b>14 TOTAL</b>	20	329	1,679	20	349	1,679
<b>15 TOTAL COE/USBR</b>	698	16,273	49,162	698	16,971	49,162
<b>16 NETWORK</b>	676	15,828	47,617	676	16,504	47,617
<b>17 DELIVERY</b>	22	445	1,545	22	467	1,545
<b>18 TOTAL TRANSMISSION</b>	698	16,273	49,162	698	16,971	49,162
	avg acc d	net plnt	interest	avg acc d	net plnt	interest
	15,490	32,127	1,089	16,166	31,451	1,036
	434	1,111	38	456	1,089	36
	15,924	33,238	1,127	16,622	32,540	1,072



## **CHAPTER 3**

### **TRANSMISSION EXPENSES**

#### **I. Introduction**

This chapter compiles the expenses that are the basis for cost recovery in determination of transmission revenue requirements for the rate approval period.

#### **II. Expenses**

BPA used preliminary O&M expenses for the initial proposal. The final study will reflect the spending level process and decisions explained in Chapter 2 of the Study.

Inter-business line expenses, included in the initial rate proposal of BPA's wholesale power rate case, are the generation inputs for ancillary services and the COE and BOR costs of transmission and delivery facilities of those agencies.

Depreciation expense, calculated using the straight-line method and remaining life technique is determined for lines, substations, and each of the FERC Accounts in the general plant category.  
*See Chapter 4 - FCRTS Investment Base.*

Interest expense is calculated in the transmission repayment study, using the capital appropriations and BPA revenue bonds issued to Treasury at individual interest rates.

***See Chapter 5 - Projected Cash Balances / Interest Credit*** for calculation of the interest credit on cash reserves.

**Transmission O&M Programs**

\$(000)	2002	2003
1 Transmission G&A	22,200	23,800
2 Transmission Marketing and Scheduling	15,246	15,703
3 Transmission System Operations	30,996	32,106
4 Transmission System Maintenance	71,300	73,400
5 Transmission System Development	23,739	23,939
6 Support Services	11,890	12,246
7 TBL Services		
8 Environment	5,100	5,300
9 Administrative & Support Services	30,000	28,100
10 Between Business Line Expenses	84,276	84,243
11 CSRS Pension Expense	27,600	17,600
12 Total System Operation & Maintenance	322,347	316,438

**PBL Revenue & Expense Forecast--  
Ancillary & Reserve Services 2002-2006**

	<b>FY 2002 Gross Revenue</b>	<b>FY 2003 Gross Revenue</b>
Federal Remedial Action Scheme	\$231,470	\$231,470
Generation Supplied Reactive	\$25,000,008	\$25,000,008
Station Service	\$1,723,572	\$1,723,572
Step-up Transformers	\$0	\$0
Regulating Reserve	\$11,544,072	\$11,544,072
Spinning Reserve	\$17,559,876	\$17,559,876
Non Spinning Reserve	\$17,559,876	\$17,559,876
COE/BOR Network/delivery Facilities	\$3,701,004	\$3,684,000
<b>Total</b>	<b>\$77,319,878</b>	<b>\$77,302,874</b>

Capitalization Adjustment  
1997-2025

FY	Forecast per Repayment Model	Actual amounts	Capitalization Adjustment Balance	1.2606	Rate	Case	Adjusted	
					Generation		Transmission	
1997	50,642	63,841	2,525,786		36,744	<b>46,321</b>		17,520
1998	51,471	64,886	2,460,900		36,237	<b>45,682</b>		19,204
1999	52,240	65,855	2,395,044		36,680	<b>46,240</b>		19,615
2000	53,524	67,474	2,327,570		37,882	<b>47,755</b>		19,719
2001	54,571	68,794	2,258,776		38,070	<b>47,992</b>		20,802
2002	53,430	67,356	2,191,421		37,868	<b>47,738</b>		19,618
2003	53,705	67,702	2,123,718		37,702	<b>47,528</b>		20,174
2004	53,614	67,588	2,056,131		37,977	<b>47,875</b>		19,713
2005	51,486	64,905	1,991,226		35,530	<b>44,790</b>		20,115
2006		64,905	1,926,321			<b>44,790</b>		20,115
2007		64,905	1,861,416			<b>44,790</b>		20,115
2008		64,905	1,796,511			<b>44,790</b>		20,115
2009		64,905	1,731,606			<b>44,790</b>		20,115
2010		64,905	1,666,701			<b>44,790</b>		20,115
2011		64,905	1,601,796			<b>44,790</b>		20,115
2012		64,905	1,536,891			<b>44,790</b>		20,115
2013		64,905	1,471,986			<b>44,790</b>		20,115
2014		64,905	1,407,081			<b>44,790</b>		20,115
2015		64,905	1,342,176			<b>44,790</b>		20,115
2016		64,905	1,277,271			<b>44,790</b>		20,115
2017		64,905	1,212,366			<b>44,790</b>		20,115
2018		64,905	1,147,461			<b>44,790</b>		20,115
2019		64,905	1,082,556			<b>44,790</b>		20,115
2020		64,905	1,017,651			<b>44,790</b>		20,115
2021		64,905	952,746			<b>44,790</b>		20,115
2022		64,905	887,841			<b>44,790</b>		20,115
2023		64,905	822,936			<b>44,790</b>		20,115
2024		64,905	758,031			<b>44,790</b>		20,115
2025		64,905	693,126			<b>44,790</b>		20,115
2026		64,905	628,221			<b>44,790</b>		20,115
2027		64,905	563,316			<b>44,790</b>		20,115
2028		64,905	498,411			<b>44,790</b>		20,115
2029		64,905	433,506			<b>44,790</b>		20,115
2030		64,905	368,601			<b>44,790</b>		20,115
2031		64,905	303,696			<b>44,790</b>		20,115
2032		64,905	238,791			<b>44,790</b>		20,115
2033		64,905	173,886			<b>44,790</b>		20,115
2034		64,905	108,981			<b>44,790</b>		20,115
2035		64,905	44,076			<b>44,790</b>		20,115
2036		44,076	(0)					

## **CHAPTER 4**

### **FCRTS INVESTMENT BASE**

#### **I. Introduction**

This chapter documents the development of the FCRTS investment base by transmission segment and ancillary service for the rate approval period. The investment data are the source of depreciation calculations and provide the basis for the segmentation of net interest expense and planned net revenues.

#### **II. Methodology**

The FCRTS plant investment is compiled by segment and ancillary service. The historical investment information is prepared in the Segmentation Study (TR-02-E-BPA-02). BPA general plant contains equipment associated previously with the generation function, which is now reflected in ancillary services. The general plant investment is identified according to different types of facilities (communications, supervisory control, buildings, etc.) by FERC Account. A direction of effort study was conducted to identify the portions of control facilities and communications equipment devoted to transmission and the individual ancillary services.

Depreciation is calculated using the straight-line method, remaining life technique. For general plant categories, annual depreciation rates are used unadjusted. For lines and substations, the annual rate has been weighted by the groups that compose these facilities, e.g., Substations is made up of land and land rights, structures and improvements, and station equipment. Both historical investment and forecasted additions are depreciated according to their group rate.

Projected investments and projected depreciation expenses are accumulated with historical amounts to provide projected cumulative investments and accumulated depreciation for each

forecasted year. The investment base is calculated for each year of the rate period as an annual average.

### **III. Depreciation Study**

In 1999, BPA contracted for a study recommending annual depreciation accrual rates and estimates of service life and net salvage characteristics for transmission and general plant. This study updated and replaced the prior 1987 study. BPA commissioned the new study for several reasons, including:

1. FERC recommends a depreciation study be conducted every 3 to 5 years and the most recent depreciation study was over 10 years old;
2. BPA's independent, external auditors, PriceWaterhouseCoopers requested a new study be performed;
3. Changes in the industry, such as restructuring, maintenance policies, and technology advances made it advisable to bring the depreciation study up to date.

The consultant, Gannett Fleming Valuation and Rate Consultants, Inc., a member of the Society for Depreciation Professionals, was selected to perform the depreciation study.

PriceWaterhouseCoopers reviewed their qualifications and found them acceptable. A preliminary copy of the report was presented to TBL operations and financial personnel for review of the findings. Additional information provided by TBL staff was incorporated into the final report, which was reviewed by PriceWaterhouseCooper. BPA management accepted the study and implemented recommendations, including incorporation into BPA's audited 1999 Financial Statements. Where applicable, these results were used in the repayment model and initial proposal revenue requirements study for transmission and ancillary services rates.

**FCRTS INVESTMENT BASE**  
**FY 2002**  
**(\\$ IN THOUSANDS)**

		A BALANCE-AS-OF 2002	B 2001	C AVERAGE 2002
1	COMPLETED PLANT			
2	GENER-INTEGRATION	62,611	61,968	62,290
3	NETWORK	3,397,728	3,239,141	3,318,435
4	SOUTHERN INTERTIE	687,002	682,422	684,712
5	EASTERN INERTIE	123,593	123,008	123,301
6	UTILITY DELIVERY	64,755	62,954	63,855
7	DSI DELIVERY	58,730	56,929	57,830
8	PLANT HELD FOR FUTURE USE	3,245	3,245	3,245
9	PLANT LEASED	189	189	189
10	GENERAL PLANT	1,024,812	957,470	991,141
11	TOTAL COMPLETED PLANT	5,422,665	5,187,326	5,304,998
12	ACCUMULATED DEPRECIATION			
13	GENER-INTEGRATION	22,449	20,666	21,558
14	NETWORK	1,541,014	1,453,240	1,497,127
15	SOUTHERN INTERTIE	248,335	228,862	238,599
16	EASTERN INERTIE	59,374	56,366	57,870
17	UTILITY DELIVERY	19,348	17,389	18,369
18	DSI DELIVERY	18,765	16,992	17,879
19	PLANT HELD FOR FUTURE USE	0	0	0
20	PLANT LEASED	189	189	189
21	GENERAL PLANT	452,570	385,646	419,108
22	TOTAL ACCUMULATED DEPRECIATION	2,362,044	2,179,350	2,270,699
23	NET PLANT INVESTMENT			
24	GENER-INTEGRATION	40,162	41,302	40,732
25	NETWORK	1,856,714	1,785,901	1,821,308
26	SOUTHERN INTERTIE	438,667	453,560	446,113
27	EASTERN INERTIE	64,219	66,642	65,431
28	UTILITY DELIVERY	45,407	45,565	45,486
29	DSI DELIVERY	39,965	39,937	39,951
30	PLANT HELD FOR FUTURE USE	3,245	3,245	3,245
31	PLANT LEASED	0	0	0
32	GENERAL PLANT	572,242	571,824	572,033
33	TOTAL NET PLANT INVESTMENT	3,060,621	3,007,976	3,034,299

**FCRTS INVESTMENT BASE**

**FY 2003**

**(\$ IN THOUSANDS)**

		<b>A</b>	<b>B</b>	<b>C</b>
		<b>BALANCE-AS-OF</b>	<b>2002</b>	<b>AVERAGE</b>
		<b>2003</b>	<b>2002</b>	<b>2003</b>
1	COMPLETED PLANT			
2	GENER-INTEGRATION	63,249	62,611	62,930
3	NETWORK	3,583,740	3,397,728	3,490,734
4	SOUTHERN INTERTIE	691,589	687,002	689,296
5	EASTERN INERTIE	124,164	123,593	123,879
6	UTILITY DELIVERY	66,546	64,755	65,651
7	DSI DELIVERY	60,521	58,730	59,626
8	PLANT HELD FOR FUTURE USE	3,245	3,245	3,245
9	PLANT LEASED	189	189	189
10	GENERAL PLANT	1,083,100	1,024,812	1,053,956
11	TOTAL COMPLETED PLANT	5,676,343	5,422,665	5,549,506
12	ACCUMULATED DEPRECIATION			
13	GENER-INTEGRATION	24,252	22,449	23,351
14	NETWORK	1,633,392	1,541,014	1,587,203
15	SOUTHERN INTERTIE	267,938	248,335	258,137
16	EASTERN INERTIE	62,398	59,374	60,886
17	UTILITY DELIVERY	21,359	19,348	20,354
18	DSI DELIVERY	20,591	18,765	19,678
19	PLANT HELD FOR FUTURE USE	0	0	0
20	PLANT LEASED	189	189	189
21	GENERAL PLANT	523,514	452,570	488,042
22	TOTAL ACCUMULATED DEPRECIATION	2,553,633	2,362,044	2,457,840
23	NET PLANT INVESTMENT			
24	GENER-INTEGRATION	38,997	40,162	39,579
25	NETWORK	1,950,348	1,856,714	1,903,531
26	SOUTHERN INTERTIE	423,651	438,667	431,159
27	EASTERN INERTIE	61,766	64,219	62,993
28	UTILITY DELIVERY	45,187	45,407	45,297
29	DSI DELIVERY	39,930	39,965	39,948
30	PLANT HELD FOR FUTURE USE	3,245	3,245	3,245
31	PLANT LEASED	0	0	0
32	GENERAL PLANT	559,586	572,242	565,914
33	TOTAL NET PLANT INVESTMENT	3,122,710	3,060,621	3,091,666

**INVESTMENT BASE FOR ANCILLARY SERVICES**  
**FERC ACCOUNTS 353 and 397**  
**(*\$000*)**

	<b>A</b>	<b>B</b>	<b>C</b>		<b>A</b>	<b>B</b>	<b>C</b>
	<b>AVERAGE</b>				<b>AVERAGE</b>		
	<b>2002</b>	<b>2001</b>	<b>2002</b>		<b>2003</b>	<b>2002</b>	<b>2003</b>
<b>1 COMPLETED PLANT</b>							
2 Sched, Syst Control, and Disp Serv	272,906	252,778	262,842		291,335	272,906	282,121
3 Reactive Supply and Volt Control	7,832	7,220	7,526		8,402	7,832	8,117
4 Regulation and Freq Response	28,750	25,953	27,352		31,282	28,750	30,016
5 Energy Imbalance	0	0	-		0	0	-
6 Op Reserve - Spinning Reserve	2,343	2,117	2,230		2,550	2,343	2,447
7 Op Reserve - Supplem Reserve	2,221	1,995	2,108		2,428	2,221	2,325
8 Transmission	483,083	450,591	466,837		508,372	483,083	495,728
9 Total Completed Plant	797,135	740,654	768,895		844,369	797,135	820,754
<b>10 ACCUMULATED DEPRECIATION</b>							
11 Sched, Syst Control, and Disp Serv	102,914	84,753	93,834		122,452	102,914	112,683
12 Reactive Supply and Volt Control	2,906	2,380	2,643		3,473	2,906	3,190
13 Regulation and Freq Response	10,150	8,339	9,245		12,138	10,150	11,144
14 Energy Imbalance	0	0	-		0	0	-
15 Op Reserve - Spinning Reserve	812	634	723		1,007	812	910
16 Op Reserve - Supplem Reserve	756	584	670		944	756	850
17 Transmission	159,879	136,853	148,366		184,059	159,879	171,969
18 Total Accumulated Depreciation	277,417	233,543	255,481		324,073	277,417	300,746
<b>19 NET PLANT INVESTMENT</b>							
20 Sched, Syst Control, and Disp Serv	169,992	168,025	169,008		168,883	169,992	169,438
21 Reactive Supply and Volt Control	4,926	4,840	4,883		4,929	4,926	4,927
22 Regulation and Freq Response	18,600	17,614	18,107		19,144	18,600	18,872
23 Energy Imbalance	0	0	0		0	0	0
24 Op Reserve - Spinning Reserve	1,531	1,483	1,507		1,543	1,531	1,537
25 Op Reserve - Supplem Reserve	1,465	1,411	1,438		1,484	1,465	1,475
26 Transmission	323,204	313,738	318,471		324,313	323,204	323,759
27 Total Net Plant Investment	519,718	507,111	513,414		520,296	519,718	520,008

**ANCILLARY SERVICES**  
**DEPRECIATION EXPENSE**  
**(\$THOUSANDS)**

	FERC ACCOUNT			1999			FERC ACCOUNT			2000			FERC ACCOUNT			2001			FERC ACCOUNT			2002			FERC ACCOUNT			2003		
	353	397	TOTAL	353	397	TOTAL	353	397	TOTAL	353	397	TOTAL	353	397	TOTAL	353	397	TOTAL	353	397	TOTAL	353	397	TOTAL	353	397	TOTAL			
Sched, Syst Control, and Disp Serv	4,939	8,463	13,402	6,235	8,805	15,040	7,443	9,229	16,672	8,596	9,565	18,161	9,691	9,847	19,538															
Reactive Supply and Volt Control	174	218	392	202	232	434	232	250	482	262	264	526	291	276	567															
Regulation and Freq Response	231	981	1,212	339	1,066	1,405	447	1,172	1,619	555	1,256	1,811	661	1,327	1,988															
Energy Imbalance	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0															
Op Reserve - Spinning Reserve	92	26	118	114	26	140	134	26	160	152	26	178	169	26	195															
Op Reserve - Supplem Reserve	92	19	111	114	19	133	134	19	153	153	19	172	169	19	188															
Total Depreciation Expense	5,528	9,707	15,235	7,004	10,148	17,152	8,390	10,696	19,086	9,718	11,130	20,848	10,981	11,495	22,476															

**ANCILLARY SERVICES**  
**ACCUMULATED DEPRECIATION**  
**(\$THOUSANDS)**

	FERC ACCOUNT			1998			FERC ACCOUNT			1999			FERC ACCOUNT			2000			FERC ACCOUNT			2001			FERC ACCOUNT			2002			FERC ACCOUNT			2003		
	353	397	TOTAL	353	397	TOTAL	353	397	TOTAL	353	397	TOTAL	353	397	TOTAL	353	397	TOTAL	353	397	TOTAL	353	397	TOTAL	353	397	TOTAL	353	397	TOTAL						
Sched, Syst Control, and Disp Serv	5,565	34,074	39,639	10,504	42,537	53,041	16,739	51,342	68,081	24,182	60,571	84,753	32,778	70,136	102,914	42,469	79,983	122,452																		
Reactive Supply and Volt Control	199	873	1,072	373	1,091	1,464	575	1,323	1,898	807	1,573	2,380	1,069	1,837	2,906	1,360	2,113	3,473																		
Regulation and Freq Response	199	3,904	4,103	430	4,885	5,315	769	5,951	6,720	1,216	7,123	8,339	1,771	8,379	10,150	2,432	9,706	12,138																		
Energy Imbalance	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0							
Op Reserve - Spinning Reserve	109	107	216	201	133	334	315	159	474	449	185	634	601	211	812	770	237	1,007																		
Op Reserve - Supplem Reserve	109	78	187	201	97	298	315	116	431	449	135	584	602	154	756	771	173	944																		
Total Accumulated Depreciation	6,181	39,036	45,217	11,709	48,743	60,452	18,713	58,891	77,604	27,103	69,587	96,690	36,821	80,717	117,538	47,802	92,212	140,014																		

**ANCILLARY SERVICES**  
**PLANT-IN-SERVICE**  
**(\$THOUSANDS)**

	FERC ACCOUNT		TOTAL	FERC ACCOUNT		1999	FERC ACCOUNT		2000	FERC ACCOUNT		2001	FERC ACCOUNT		2002	FERC ACCOUNT		2003
	353	397	1998	353	397	TOTAL												
Sched, Syst Control, and Disp Serv	51,948	146,003	197,951	61,055	147,432	208,487	77,070	153,391	230,461	91,999	160,779	252,778	106,260	166,646	272,906	119,789	171,546	291,335
Reactive Supply and Volt Control	1,855	3,739	5,594	2,150	3,799	5,949	2,501	4,047	6,548	2,865	4,355	7,220	3,233	4,599	7,832	3,599	4,803	8,402
Regulation and Freq Response	1,855	16,729	18,584	2,859	17,086	19,945	4,192	18,576	22,768	5,530	20,423	25,953	6,860	21,890	28,750	8,167	23,115	31,282
Energy Imbalance		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Op Reserve - Spinning Reserve	1,013	458	1,471	1,132	458	1,590	1,413	458	1,871	1,659	458	2,117	1,885	458	2,343	2,092	458	2,550
Op Reserve - Supplem Reserve	1,015	334	1,349	1,134	334	1,468	1,415	334	1,749	1,661	334	1,995	1,887	334	2,221	2,094	334	2,428
Total Plant-in-Service	57,686	167,263	224,949	68,330	169,109	237,439	86,591	176,806	263,397	#####	186,349	290,063	120,125	193,927	314,052	135,741	200,256	335,997

**ANCILLARY SERVICES**  
**PLANT ADDITIONS**  
**(\$THOUSANDS)**

	FERC ACCOUNT		TOTAL	FERC ACCOUNT		1999	FERC ACCOUNT		2000	FERC ACCOUNT		2001	FERC ACCOUNT		2002	FERC ACCOUNT		2003
	353	397	TOTAL	353	397	TOTAL												
Sched, Syst Control, and Disp Serv	9,107	1,429	10,536	16,015	5,959	21,974	14,929	7,388	22,317	14,261	5,867	20,128	13,529	4,900	18,429			
Reactive Supply and Volt Control	295	60	355	351	248	599	364	308	672	368	244	612	366	204	570			
Regulation and Freq Response	1,004	357	1,361	1,333	1,490	2,823	1,338	1,847	3,185	1,330	1,467	2,797	1,307	1,225	2,532			
Energy Imbalance		0			0				0		0		0		0			0
Op Reserve - Spinning Reserve	119		119	281		281	246		246	226		226	207		207			
Op Reserve - Supplem Reserve	119		119	281		281	246		246	226		226	207		207			
Total Additions	10,644	1,846	12,490	18,261	7,697	25,958	17,123	9,543	26,666	16,411	7,578	23,989	15,616	6,329	21,945			

BPA GENERAL PLANT  
ACCUMULATED DEPRECIATION  
(\$THOUSANDS)

	FERC ACCT	ANCILL SERV	FY 1998 TRANS	FY 1998 TOTAL	ANCILL SERV	FY 1999 TRANS	FY 1999 TOTAL	ANCILL SERV	FY 2000 TRANS	FY 2000 TOTAL	ANCILL SERV	FY 2001 TRANS	FY 2001 TOTAL
1 LAND & LAND RIGHTS	389		449	449	0	601	601	0	753	753	0	905	905
2 STRUCTURES & IMPROVEMENTS	390	0	20,952	20,952	0	23,273	23,273	0	25,657	25,657	0	28,118	28,118
3 OFFICE FURNITURE & FIXTURES	391.1		455	455	0	594	594	0	733	733	0	896	896
4 DATA PROCESSING -EQUIPMENT	391.2		12,469	12,469	0	18,960	18,960	0	25,913	25,913	0	33,218	33,218
5 DATA PROCESSING -SOFTWARE	391.3		26,161	26,161	0	31,215	31,215	0	37,678	37,678	0	44,682	44,682
6 TRANSPORT EQUIPMENT	392.1		13,843	13,843	0	15,928	15,928	0	18,065	18,065	0	20,285	20,285
7 HELICOPTERS	392.2		1,876	1,876	0	2,078	2,078	0	2,290	2,290	0	2,518	2,518
8 AIRPLANES	392.3		2,065	2,065	0	2,198	2,198	0	2,341	2,341	0	2,500	2,500
9 STORES EQUIPMENT	393		1,783	1,783	0	1,873	1,873	0	1,979	1,979	0	2,110	2,110
10 TOOLS, SHOP & GARAGE EQUIPMENT	394		2,570	2,570	0	2,816	2,816	0	3,074	3,074	0	3,351	3,351
11 LAB EQUIPMENT	395		17,541	17,541	0	20,165	20,165	0	22,824	22,824	0	25,541	25,541
12 TEST FACILITIES	395.1		2,825	2,825	0	2,885	2,885	0	2,945	2,945	0	3,005	3,005
13 POWER OPERATED EQUIPMENT	396		9,021	9,021	0	10,328	10,328	0	11,677	11,677	0	13,092	13,092
14 COMMUNICATIONS EQUIPMENT	397	39,034	49,960	88,994	48,741	62,484	111,225	58,889	75,991	134,880	69,585	90,718	160,303
15 MISC EQUIPMENT	398		3	3	0	3	3	0	3	3	0	3	3
16 SUBTOTAL GENERAL PLANT		39,034	161,973	201,007	48,741	195,401	244,142	58,889	231,923	290,812	69,585	270,942	340,527
17 STATION EQUIPMENT	353	6,180	5,193	11,373	11,708	9,299	21,007	18,712	13,569	32,281	27,102	18,017	45,119
18 TOTAL GENERAL PLANT		45,214	167,166	212,380	60,449	204,700	265,149	77,601	245,492	323,093	96,687	288,959	385,646

**BPA GENERAL PLANT**  
**ACCUMULATED DEPRECIATION**  
**(\$THOUSANDS)**

	FERC ACCT	ANCILL SERV	FY 2002		ANCILL SERV	FY 2003	
			TRANS	TOTAL		TRANS	TOTAL
<b>1 LAND &amp; LAND RIGHTS</b>	389	0	1,057	1,057	0	1,209	1,209
<b>2 STRUCTURES &amp; IMPROVEMENTS</b>	390	0	30,815	30,815	0	33,669	33,669
<b>3 OFFICE FURNITURE &amp; FIXTURES</b>	391.1	0	1,082	1,082	0	1,291	1,291
<b>4 DATA PROCESSING -EQUIPMENT</b>	391.2	0	40,830	40,830	0	48,753	48,753
<b>5 DATA PROCESSING -SOFTWARE</b>	391.3	0	52,287	52,287	0	60,504	60,504
<b>6 TRANSPORT EQUIPMENT</b>	392.1	0	22,589	22,589	0	24,979	24,979
<b>7 HELICOPTERS</b>	392.2	0	2,763	2,763	0	3,024	3,024
<b>8 AIRPLANES</b>	392.3	0	2,676	2,676	0	2,868	2,868
<b>9 STORES EQUIPMENT</b>	393	0	2,267	2,267	0	2,450	2,450
<b>10 TOOLS, SHOP &amp; GARAGE EQUIPMENT</b>	394	0	3,648	3,648	0	3,965	3,965
<b>11 LAB EQUIPMENT</b>	395	0	28,315	28,315	0	31,148	31,148
<b>12 TEST FACILITIES</b>	395.1	0	3,065	3,065	0	3,125	3,125
<b>13 POWER OPERATED EQUIPMENT</b>	396	0	14,574	14,574	0	16,125	16,125
<b>14 COMMUNICATIONS EQUIPMENT</b>	397	80,715	106,413	187,128	92,210	122,916	215,126
<b>15 MISC EQUIPMENT</b>	398	0	3	3	0	3	3
<b>16 SUBTOTAL GENERAL PLANT</b>		80,715	312,384	393,099	92,210	356,029	448,239
<b>17 STATION EQUIPMENT</b>	353	36,820	22,651	59,471	47,801	27,474	75,275
<b>18 TOTAL GENERAL PLANT</b>		117,535	335,035	452,570	140,011	383,503	523,514

BPA GENERAL PLANT  
 DEPRECIATION EXPENSE  
 (\$THOUSANDS)

	FERC ACCT	ANCILL SERV	FY 1999 TRANS	FY 1999 TOTAL	ANCILL SERV	FY 2000 TRANS	FY 2000 TOTAL	ANCILL SERV	FY 2001 TRANS	FY 2001 TOTAL
<b>1 LAND &amp; LAND RIGHTS</b>	389	0	152	152	0	152	152	0	152	152
<b>2 STRUCTURES &amp; IMPROVEMENTS</b>	390	0	2,321	2,321	0	2,384	2,384	0	2,461	2,461
<b>3 OFFICE FURNITURE &amp; FIXTURES</b>	391.1	0	139	139	0	139	139	0	163	163
<b>4 DATA PROCESSING -EQUIPMENT</b>	391.2	0	6,491	6,491	0	6,953	6,953	0	7,305	7,305
<b>5 DATA PROCESSING -SOFTWARE</b>	391.3	0	5,054	5,054	0	6,463	6,463	0	7,004	7,004
<b>6 TRANSPORT EQUIPMENT</b>	392.1	0	2,085	2,085	0	2,137	2,137	0	2,220	2,220
<b>7 HELICOPTERS</b>	392.2	0	202	202	0	212	212	0	228	228
<b>8 AIRPLANES</b>	392.3	0	133	133	0	143	143	0	159	159
<b>9 STORES EQUIPMENT</b>	393	0	90	90	0	106	106	0	131	131
<b>10 TOOLS, SHOP &amp; GARAGE EQUIPMENT</b>	394	0	246	246	0	258	258	0	277	277
<b>11 LAB EQUIPMENT</b>	395	0	2,624	2,624	0	2,659	2,659	0	2,717	2,717
<b>12 TEST FACILITIES</b>	395.1	0	60	60	0	60	60	0	60	60
<b>13 POWER OPERATED EQUIPMENT</b>	396	0	1,307	1,307	0	1,349	1,349	0	1,415	1,415
<b>14 COMMUNICATIONS EQUIPMENT</b>	397	9,707	12,524	22,231	10,148	13,507	23,655	10,696	14,727	25,423
<b>15 MISC EQUIPMENT</b>	398	0	0	0	0	0	0	0	0	0
<b>16 SUBTOTAL GENERAL PLANT</b>		9,707	33,428	43,135	10,148	36,522	46,670	10,696	39,019	49,715
<b>17 STATION EQUIPMENT</b>	353	5,528	4,106	9,634	7,004	4,270	11,274	8,390	4,448	12,838
<b>18 TOTAL GENERAL PLANT</b>		15,235	37,534	52,769	17,152	40,792	57,944	19,086	43,467	62,553

BPA GENERAL PLANT  
 DEPRECIATION EXPENSE  
 (\$THOUSANDS)

	FERC ACCT	ANCILL SERV	FY 2002 TRANS	FY 2002 TOTAL	ANCILL SERV	FY 2003 TRANS	FY 2003 TOTAL
<b>1 LAND &amp; LAND RIGHTS</b>	389	0	152	152	0	152	152
<b>2 STRUCTURES &amp; IMPROVEMENTS</b>	390	0	2,697	2,697	0	2,854	2,854
<b>3 OFFICE FURNITURE &amp; FIXTURES</b>	391.1	0	186	186	0	209	209
<b>4 DATA PROCESSING -EQUIPMENT</b>	391.2	0	7,612	7,612	0	7,923	7,923
<b>5 DATA PROCESSING -SOFTWARE</b>	391.3	0	7,605	7,605	0	8,217	8,217
<b>6 TRANSPORT EQUIPMENT</b>	392.1	0	2,304	2,304	0	2,390	2,390
<b>7 HELICOPTERS</b>	392.2	0	245	245	0	261	261
<b>8 AIRPLANES</b>	392.3	0	176	176	0	192	192
<b>9 STORES EQUIPMENT</b>	393	0	157	157	0	183	183
<b>10 TOOLS, SHOP &amp; GARAGE EQUIPMENT</b>	394	0	297	297	0	317	317
<b>11 LAB EQUIPMENT</b>	395	0	2,774	2,774	0	2,833	2,833
<b>12 TEST FACILITIES</b>	395.1	0	60	60	0	60	60
<b>13 POWER OPERATED EQUIPMENT</b>	396	0	1,482	1,482	0	1,551	1,551
<b>14 COMMUNICATIONS EQUIPMENT</b>	397	11,130	15,695	26,825	11,495	16,503	27,998
<b>15 MISC EQUIPMENT</b>	398	0	0	0	0	0	0
<b>16 SUBTOTAL GENERAL PLANT</b>		11,130	41,442	52,572	11,495	43,645	55,140
<b>17 STATION EQUIPMENT</b>	353	9,718	4,634	14,352	10,981	4,823	15,804
<b>18 TOTAL GENERAL PLANT</b>		20,848	46,076	66,924	22,476	48,468	70,944

**BPA TRANSMISSION GENERAL PLANT**  
**PROJECTED PLANT ADDITIONS**

	FERC ACCT	FY 1999 ADDTNS	FY 2000 ADDTNS	FY 2001 ADDTNS	FY 2002 ADDTNS	FY 2003 ADDTNS
<b>1 LAND &amp; LAND RIGHTS</b>	389	0	0	0	0	0
<b>2 STRUCTURES &amp; IMPROVEMENTS</b>	390	7,980	3,582	4,358	13,327	8,864
<b>3 OFFICE FURNITURE &amp; FIXTURES</b>	391.1	503	8	450	449	454
<b>4 DATA PROCESSING -EQUIPMENT</b>	391.2	3,391	3,290	2,507	2,182	2,211
<b>5 DATA PROCESSING -SOFTWARE</b>	391.3	6,328	7,921	3,041	3,380	3,437
<b>6 TRANSPORT EQUIPMENT</b>	392.1	443	448	718	725	741
<b>7 HELICOPTERS</b>	392.2	297	300	481	486	496
<b>8 AIRPLANES</b>	392.3	297	300	481	486	496
<b>9 STORES EQUIPMENT</b>	393	443	448	718	725	741
<b>10 TOOLS, SHOP &amp; GARAGE EQUIPMENT</b>	394	297	300	481	486	496
<b>11 LAB EQUIPMENT</b>	395	595	601	963	971	991
<b>12 TEST FACILITIES</b>	395.1	0	0	0	0	0
<b>13 POWER OPERATED EQUIPMENT</b>	396	595	601	963	971	991
<b>14 COMMUNICATIONS EQUIPMENT</b>	397	5,954	24,829	30,784	24,444	20,417
<b>15 MISC EQUIPMENT</b>	398	0	0	0	0	0
<b>16 SUBTOTAL GENERAL PLANT</b>		27,123	42,628	45,945	48,632	40,335
<b>17 STATION EQUIPMENT</b>	353	12,923	20,296	19,318	18,710	17,953
<b>18 TOTAL GENERAL PLANT</b>		40,046	62,924	65,263	67,342	58,288

**BPA GENERAL PLANT**  
**CUMULATIVE PLANT INVESTMENT**  
**(\$THOUSANDS)**

	FERC ACCT	ANCILL SERV	FY 2000 TRANS	FY 2000 TOTAL	ANCILL SERV	FY 2001 TRANS	FY 2001 TOTAL
<b>1 LAND &amp; LAND RIGHTS</b>	389		11,309	11,309		11,309	11,309
<b>2 STRUCTURES &amp; IMPROVEMENTS</b>	390	0	134,689	134,689	0	139,047	139,047
<b>3 OFFICE FURNITURE &amp; FIXTURES</b>	391.1		2,689	2,689		3,139	3,139
<b>4 DATA PROCESSING -EQUIPMENT</b>	391.2		49,488	49,488		51,995	51,995
<b>5 DATA PROCESSING -SOFTWARE</b>	391.3		36,329	36,329		39,370	39,370
<b>6 TRANSPORT EQUIPMENT</b>	392.1		18,472	18,472		19,190	19,190
<b>7 HELICOPTERS</b>	392.2		6,313	6,313		6,794	6,794
<b>8 AIRPLANES</b>	392.3		4,262	4,262		4,743	4,743
<b>9 STORES EQUIPMENT</b>	393		2,964	2,964		3,682	3,682
<b>10 TOOLS, SHOP &amp; GARAGE EQUIPMENT</b>	394		6,386	6,386		6,867	6,867
<b>11 LAB EQUIPMENT</b>	395		44,771	44,771		45,734	45,734
<b>12 TEST FACILITIES</b>	395.1		3,507	3,507		3,507	3,507
<b>13 POWER OPERATED EQUIPMENT</b>	396		19,519	19,519		20,482	20,482
<b>14 COMMUNICATIONS EQUIPMENT</b>	397	176,806	235,321	412,127	186,349	256,562	442,911
<b>15 MISC EQUIPMENT</b>	398		4	4		4	4
<b>16 SUBTOTAL GENERAL PLANT</b>		176,806	576,023	752,829	186,349	612,425	798,774
<b>17 STATION EQUIPMENT</b>	353	86,591	52,787	139,378	103,714	54,982	158,696
<b>18 TOTAL GENERAL PLANT</b>		263,397	628,810	892,207	290,063	667,407	957,470

**BPA GENERAL PLANT**  
**CUMULATIVE PLANT INVESTMENT**  
**(\$THOUSANDS)**

	FERC ACCT	ANCILL SERV	TRANS	FY 2002 TOTAL	ANCILL SERV	TRANS	FY 2003 TOTAL
<b>1 LAND &amp; LAND RIGHTS</b>	389		11,309	11,309		11,309	11,309
<b>2 STRUCTURES &amp; IMPROVEMENTS</b>	390	0	152,374	152,374	0	161,238	161,238
<b>3 OFFICE FURNITURE &amp; FIXTURES</b>	391.1		3,588	3,588		4,042	4,042
<b>4 DATA PROCESSING -EQUIPMENT</b>	391.2		54,177	54,177		56,388	56,388
<b>5 DATA PROCESSING -SOFTWARE</b>	391.3		42,750	42,750		46,187	46,187
<b>6 TRANSPORT EQUIPMENT</b>	392.1		19,915	19,915		20,656	20,656
<b>7 HELICOPTERS</b>	392.2		7,280	7,280		7,776	7,776
<b>8 AIRPLANES</b>	392.3		5,229	5,229		5,725	5,725
<b>9 STORES EQUIPMENT</b>	393		4,407	4,407		5,148	5,148
<b>10 TOOLS, SHOP &amp; GARAGE EQUIPMENT</b>	394		7,353	7,353		7,849	7,849
<b>11 LAB EQUIPMENT</b>	395		46,705	46,705		47,696	47,696
<b>12 TEST FACILITIES</b>	395.1		3,507	3,507		3,507	3,507
<b>13 POWER OPERATED EQUIPMENT</b>	396		21,453	21,453		22,444	22,444
<b>14 COMMUNICATIONS EQUIPMENT</b>	397	193,927	273,428	467,355	200,256	287,516	487,772
<b>15 MISC EQUIPMENT</b>	398		4	4		4	4
<b>16 SUBTOTAL GENERAL PLANT</b>		193,927	653,479	847,406	200,256	687,485	887,741
<b>17 STATION EQUIPMENT</b>	353	120,125	57,281	177,406	135,741	59,618	195,359
<b>18 TOTAL GENERAL PLANT</b>		314,052	710,760	1,024,812	335,997	747,103	1,083,100

**ACCUMULATED DEPRECIATION SUMMARY FOR BPA TRANSMISSION PLANT**  
**( $\$000$ )**

	<b>1998</b>	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>
1 GENER-INTEGRATION	15,422	17,154	18,901	20,666	22,449	24,252
2 NETWORK	1,209,922	1,288,657	1,369,431	1,453,240	1,541,014	1,633,392
3 SOUTHERN INTERTIE	171,243	190,327	209,524	228,862	248,335	267,938
4 EASTERN INERTIE	47,432	50,399	53,374	56,366	59,374	62,398
5 UTILITY DELIVERY	9,579	12,309	15,044	17,389	19,348	21,359
6 DSi DELIVERY	9,545	12,206	14,807	16,992	18,765	20,591
7 PLANT LEASED	179	183	187	189	189	189
8 GENERAL PLANT	212,380	265,149	323,093	385,646	452,570	523,514
9 TOTAL	1,675,702	1,836,384	2,004,361	2,179,350	2,362,044	2,553,633

**Transmission Plant Depreciation**  
(\$000)

	A 1998 ACCUM DEPREC	B 1998 PLANT INVEST	C 1999 PLANT INVEST	D 1999 DEPREC EXPEN	E 1999 ACCUM DEPREC	F 2000 PLANT INVEST	G 2000 DEPREC EXPEN	H 2000 ACCUM DEPREC	I 2001 PLANT INVEST	J 2001 DEPREC EXPEN	K 2001 ACCUM DEPREC
<b>1 LINES:</b>											
2 GENER-INTEGRATION	10,727	16,557	16,557	377	11,104	16,683	379	11,483	16,802	382	11,865
3 NETWORK	1,069,952	1,651,410	1,668,450	37,846	1,107,798	1,702,790	38,432	1,146,230	1,764,496	39,527	1,185,757
4 SOUTHERN INTERTIE	74,271	197,378	198,306	4,511	78,782	199,839	4,539	83,321	201,315	4,573	87,894
5 EASTERN INERTIE	41,637	97,890	97,890	2,232	43,869	98,206	2,235	46,104	98,504	2,242	48,346
6 UTILITY DELIVERY	20	31	73	1	21	436	6	27	780	14	41
7 DSi DELIVERY	0	0	42	0	0	405	5	5	749	13	18
8 PLANT LEASED	175	185	185	4	179	185	4	183	185	2	185
9 TOTAL LINES	1,196,782	1,963,451	1,981,503	44,971	1,241,753	2,018,544	45,600	1,287,353	2,082,831	46,753	1,334,106
<b>10 SUBSTATIONS:</b>											
11 GENER-INTEGRATION	4,695	43,821	44,182	1,355	6,050	44,637	1,368	7,418	45,166	1,383	8,801
12 NETWORK	139,970	1,306,496	1,348,639	40,889	180,859	1,400,827	42,342	223,201	1,474,645	44,282	267,483
13 SOUTHERN INTERTIE	96,972	472,127	474,157	14,573	111,545	477,639	14,658	126,203	481,107	14,765	140,968
14 EASTERN INERTIE	5,795	23,866	23,866	735	6,530	24,186	740	7,270	24,504	750	8,020
15 UTILITY DELIVERY	9,559	89,220	88,008	2,729	12,288	89,200	2,729	15,017	62,174	2,331	17,348
16 DSi DELIVERY	9,545	89,089	83,686	2,661	12,206	84,878	2,596	14,802	56,180	2,172	16,974
17 PLANT LEASED	4	4	4	0	4	4	0	4	4	0	4
18 TOTAL SUBSTATIONS	266,540	2,024,623	2,062,542	62,942	329,482	2,121,371	64,433	393,915	2,143,780	65,683	459,598

**Transmission Plant Depreciation**  
**(\$000)**

	L 2002 PLANT INVEST	M 2002 DEPREC EXPEN	N 2002 ACCUM DEPREC	O 2003 PLANT INVEST	P 2003 DEPREC EXPEN	Q 2003 ACCUM DEPREC
<b>1 LINES:</b>						
2 GENER-INTEGRATION	16,915	384	12,249	17,025	387	12,636
3 NETWORK	1,844,082	41,138	1,226,895	1,940,135	43,140	1,270,035
4 SOUTHERN INTERTIE	202,716	4,606	92,500	204,127	4,638	97,138
5 EASTERN INERTIE	98,785	2,249	50,595	99,060	2,255	52,850
6 UTILITY DELIVERY	1,150	22	63	1,515	30	93
7 DSi DELIVERY	1,119	21	39	1,484	30	69
8 PLANT LEASED	185	0	185	185	0	185
9 TOTAL LINES	2,164,952	48,420	1,382,526	2,263,531	50,480	1,433,006
<b>10 SUBSTATIONS:</b>						
11 GENER-INTEGRATION	45,696	1,399	10,200	46,224	1,416	11,616
12 NETWORK	1,553,646	46,636	314,119	1,643,605	49,238	363,357
13 SOUTHERN INTERTIE	484,286	14,867	155,835	487,462	14,965	170,800
14 EASTERN INERTIE	24,808	759	8,779	25,104	769	9,548
15 UTILITY DELIVERY	63,605	1,937	19,285	65,031	1,981	21,266
16 DSi DELIVERY	57,611	1,752	18,726	59,037	1,796	20,522
17 PLANT LEASED	4	0	4	4	0	4
18 TOTAL SUBSTATIONS	2,229,656	67,350	526,948	2,326,467	70,165	597,113

### ANNUAL ACCRUAL RATE WEIGHTINGS

<b>DESCRIPTION</b>	<b>FERC ACCT</b>	<b>A</b>	<b>B</b>	<b>C</b>
		<b>INVESTMENT</b>	<b>ANNUAL ACCRUAL</b>	<b>WTD RATE (B/A)</b>
SUBSTATIONS:				
MISC INTANGIBLE PLANT	303	8,237	197	
LAND & LAND RIGHTS	350	12,230	164	
STRUCTURES & IMPROVEMENTS	352	215,330	3,815	
STATION EQUIPMENT	353	1,818,227	59,132	
<b>TOTAL SUBSTATIONS</b>		<b>2,054,024</b>	<b>63,308</b>	<b>3.08%</b>
LINES:				
LAND & LAND RIGHTS	350	109,044	1,462	
TOWERS & FIXTURES	354	768,159	15,074	
POLES & FIXTURES	355	94,945	3,322	
OVERHEAD CONDUCTORS	356	890,135	23,160	
UNDERGROUND CONDUCTORS	358	9,109	361	
ROADS & TRAILS	359	81,653	1,102	
<b>TOTAL LINES</b>		<b>1,953,045</b>	<b>44,481</b>	<b>2.28%</b>
TOTAL TRANSMISSION PLANT			4,007,069	
Acct 353 subset for Ancillary Services				
METERING	353	8,343	290	
CONTROL	353	60,337	5,266	
<b>TOTAL FOR 353 "GENERAL PLANT"</b>		<b>68,680</b>	<b>5,556</b>	<b>8.09%</b>

**BONNEVILLE POWER ADMINISTRATION**  
**TABLE 2. ESTIMATED SURVIVOR CURVE, NET SALVAGE, ORIGINAL COST, BOOK RESERVE AND CALCULATED ANNUAL  
DEPRECIATION ACCRUALS RELATED TO ELECTRIC PLANT AT SEPTEMBER 30, 1998**  
(AVERAGE SERVICE LIFE PROCEDURE, REMAINING LIFE METHOD AND GENERAL PLANT AMORTIZATION)

ACCOUNT (1)	SURVIVOR CURVE (2)	NET SALVAGE (3)	ORIGINAL COST (4)	BOOK RESERVE (5)	FUTURE ACCRUALS (6)	ANNUAL ACCRAUL AMOUNT (7)	COMPOSITE REMAINING LIFE (8)	ANNUAL ACCRAUL RATE PERCENT (9)=(7)/(4)
303.00 MISCELLANEOUS INTANGIBLE PLANT	40-SQ	0	8,236,630.00	929,369	7,307,261	196,769	37.1	2.39
350.10 TRANSMISSION PLANT LAND RIGHTS	75-R4	0	119,809,209.00	32,010,405	87,798,804	1,625,802	54.0	1.36
352.00 STRUCTURES & IMPROVEMENTS	60-R2.5	(5)	215,330,468.00	42,399,313	183,697,681	3,814,515	48.2	1.77
353.90 STATION EQUIPMENT 1970 & PRIOR	39-S0	(10)	209,802,762.40	122,345,517	108,437,524	6,215,459	17.4	2.96
353.90 1971 & SUBSEQUENT	34-R2.5	(10)	1,591,912,569.60	422,472,980	1,328,630,848	52,333,654	25.4	3.29
TOTAL ACCOUNT 353.90			1,801,715,332.00	544,818,497	1,437,068,372	58,549,113	24.5	3.25
353.91 SUBSTATIONS ON CUSTOMER'S PREMISES	28-R1.5	(10)	9,911,166.00	4,211,481	6,690,802	401,223	16.7	4.05
353.92 PORTABLE PROPERTY (AT SUBSTATIONS)	40-SQ	(10)	6,599,936.00	2,254,730	5,005,202	182,261	27.5	2.76
353.93 METERING STATION	32-R0.5	(10)	8,343,167.00	1,833,263	7,344,221	290,385	25.3	3.48
353.94 CONTROL EQUIPMENT	13-R2.5	(10)	60,337,059.00	24,438,796	41,931,970	5,265,864	8.0	8.73
TOTAL ACCOUNT 353			1,886,906,660.00	577,556,767	1,498,040,567	64,688,846		
354.00 TOWERS & FIXTURES	65-R3	(25)	768,159,095.00	285,403,681	674,795,195	15,074,229	44.8	1.96
355.00 POLES & FIXTURES	50-R2.5	(70)	94,944,795.00	51,072,021	110,334,132	3,321,844	33.2	3.50
356.00 CONDUCTOR AND CLEARING ROW	50-R4	(25)	890,135,148.00	424,893,851	687,775,093	23,159,769	29.7	2.60
358.00 UNDERGROUND CONDUCTOR AND DEVICES	30-S3	(10)	8,109,080.00	5,687,529	4,332,358	361,291	12.0	3.97
359.00 ROADS AND TRAILS	75-R4	0	81,653,425.00	16,327,204	65,326,221	1,102,276	59.3	1.35
TOTAL TRANSMISSION PLANT			4,066,047,880.00	1,435,350,871	3,312,100,051	113,148,572		
389.00 GENERAL PLANT LAND AND LAND RIGHTS	75-R4	0	11,524,158.00	1,090,376	10,433,782	154,506	67.5	1.34
390.00 STRUCTURES AND IMPROVEMENTS	60-R2	(5)	123,247,365.00	20,270,359	109,139,380	2,176,541	50.1	1.77
391.10 OFFICE FURNITURE & EQUIPMENT OFFICE FURNITURE	20-SQ	0	3,381,638.00	1,224,192	2,157,446	175,104	12.3	5.18
391.20 DATA PROCESSING	5-SQ	0	50,279,496.00	32,321,895	17,957,602	7,063,264	2.5	14.05
391.30 SOFTWARE	5-SQ	0	32,852,321.00	12,815,144	20,037,177	5,845,074	3.4	17.79
TOTAL ACCOUNT 391			86,513,455.00	46,361,231	40,152,225	13,083,442		

**BONNEVILLE POWER ADMINISTRATION**  
**TABLE 2. ESTIMATED SURVIVOR CURVE, NET SALVAGE, ORIGINAL COST, BOOK RESERVE AND CALCULATED ANNUAL**  
**DEPRECIATION ACCRUALS RELATED TO ELECTRIC PLANT AT SEPTEMBER 30, 1998**  
**(AVERAGE SERVICE LIFE PROCEDURE, REMAINING LIFE METHOD AND GENERAL PLANT AMORTIZATION)**

ACCOUNT (1)	SURVIVOR CURVE (2)	NET SALVAGE (3)	ORIGINAL COST (4)	BOOK RESERVE (5)	FUTURE ACCRUALS (6)	ANNUAL ACCRAUL AMOUNT (7)	COMPOSITE REMAINING LIFE (8)	ANNUAL ACCRAUL RATE PERCENT (9)=(7)/(4)
<b>TRANSPORTATION EQUIPMENT</b>								
392.10 ROLLING STOCK	10-L3	0	17,580,694.00	9,920,138	7,660,556	2,034,591	3.8	11.57
392.20 HELICOPTERS	15-SQ	50	5,715,565.00	459,142	2,398,642	192,122	12.5	3.36
392.30 AIRPLANES	15-SQ	50	3,884,706.00	308,578	1,523,777	123,297	12.4	3.36
TOTAL ACCOUNT 392			26,960,965.00	10,687,858	11,582,975	2,350,010		
<b>STORES EQUIPMENT</b>								
393.00 STORES EQUIPMENT	30-SQ	0	2,072,757.00	541,943	1,530,814	73,860	20.7	3.56
394.00 TOOLS, SHOP, & GARAGE EQUIPMENT	25-SQ	0	5,788,645.00	988,536	4,800,109	233,864	20.5	4.04
<b>LABORATORY EQUIPMENT</b>								
395.00 PORTABLE & FIXED	15-SQ	0	43,575,218.00	14,201,913	29,373,035	2,586,893	11.4	5.94
395.10 TEST FACILITIES	15-SQ	0	3,506,642.00	3,334,318	172,324	59,761	2.9	1.70
TOTAL ACCOUNT 395			47,081,860.00	17,536,231	29,545,359	2,646,654		
<b>POWER OPERATED EQUIPMENT</b>								
396.00 POWER OPERATED EQUIPMENT	15-L2	0	18,323,191.00	7,906,615	10,416,576	1,265,979	8.2	6.91
<b>COMMUNICATION EQUIPMENT</b>								
397.90 PORTABLE	15-SQ	0	17,188,894.00	8,520,759	10,668,134	1,124,502	9.5	6.54
397.91 SUBSTATIONS	15-SQ	0	147,526,465.00	57,262,283	90,264,182	8,811,065	10.2	5.97
397.92 TRANS LINE	40-S4	0	64,461,274.00	1,483,181	62,978,093	1,812,360	39.1	2.50
397.93 JOINT FACILITY	15-SQ	0	733,528.00	71,805	661,723	48,361	13.7	6.59
397.94 MICROWAVE RADIO	15-SQ	0	155,064,530.00	68,519,287	86,545,233	9,335,570	9.3	6.02
TOTAL ACCOUNT 397			384,974,691.00	133,857,325	251,117,385	20,931,858		
<b>MISCELLANEOUS EQUIPMENT</b>								
398.00 MISCELLANEOUS EQUIPMENT	15-SQ	0	3,988.00	2,110	1,878	278	6.8	6.97
<b>TOTAL GENERAL PLANT</b>			706,491,075.00	239,242,584	468,720,463	42,916,992		
<b>NONDEPRECIABLE PLANT</b>								
350.00 LAND			16,882,157.00					
ACCOUNTS NOT STUDIED			1,772,487.00					
<b>TOTAL ELECTRIC PLANT</b>			4,799,430,229.00	1,675,522,824	3,788,127,775	156,262,333		

**BONNEVILLE POWER ADMINISTRATION**  
**PROJECTED TRANSMISSION PLANT INVESTMENT**  
(\$ IN THOUSANDS)

	A	B	C	D	E	F	G	H	I	J	K
	TOTAL		TOTAL		TOTAL		TOTAL		TOTAL		TOTAL
	1998	1999	1999	2000	2000	2001	2001	2002	2002	2003	2003
	INVEST	ADDITIONS	INVEST								
1 GENER-INTEGRATION	60,378	361	60,739	581	61,320	648	61,968	643	62,611	638	63,249
2 NETWORK	2,957,906	59,183	3,017,089	86,528	3,103,617	135,524	3,239,141	158,587	3,397,728	186,012	3,583,740
3 SOUTHERN INTERTIE	669,505	2,958	672,463	5,015	677,478	4,944	682,422	4,580	687,002	4,587	691,589
4 EASTERN INTERTIE	121,756	0	121,756	636	122,392	616	123,008	585	123,593	571	124,164
5 UTILITY DELIVERY	89,251	(1,170)	88,081	1,555	89,636	(26,682)	62,954	1,801	64,755	1,791	66,546
6 DSi DELIVERY	89,089	(5,361)	83,728	1,555	85,283	(28,354)	56,929	1,801	58,730	1,791	60,521
7 PLANT HELD	3,245	0	3,245	0	3,245	0	3,245	0	3,245	0	3,245
8 PLANT LEASED	189	0	189	0	189	0	189	0	189	0	189
9 GENERAL PLANT	789,237	40,046	829,283	62,924	892,207	65,263	957,470	67,342	1,024,812	58,288	1,083,100
# TOTAL BPA	4,780,556	96,017	4,876,573	158,794	5,035,367	151,959	5,187,326	235,339	5,422,665	253,678	5,676,343

**BONNEVILLE POWER ADMINISTRATION**  
**PLANT INVESTMENT ADDITIONS**  
**(\$ IN THOUSANDS)**

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
				TOTAL 1999				TOTAL 2000				TOTAL 2001			TOTAL 2002				TOTAL 2003	
	LINES	SUBS	GEN PLANT	ADDITIONS	LINES	SUBS	GEN PLANT	ADDITIONS	LINES	SUBS	GEN PLANT	ADDITIONS	LINES	SUBS	GEN PLANT	ADDITIONS	LINES	SUBS	GEN PLANT	ADDITIONS
1 GENER-INTEGRATION	0	361		361	126	455		581	119	529		648	113	530		643	110	528		638
2 NETWORK	17,040	42,143		59,183	34,340	52,188		86,528	61,706	73,818		135,524	79,586	79,001		158,587	96,053	89,959		186,012
3 SOUTHERN INTERTIE	928	2,030		2,958	1,533	3,482		5,015	1,476	3,468		4,944	1,401	3,179		4,580	1,411	3,176		4,587
4 EASTERN INERTIE	0	0		0	316	320		636	298	318		616	281	304		585	275	296		571
5 UTILITY DELIVERY	42	(1,212)		(1,170)	363	1,192		1,555	344	(27,026)		(26,682)	370	1,431		1,801	365	1,426		1,791
6 DSi DELIVERY	42	(5,403)		(5,361)	363	1,192		1,555	344	(28,698)		(28,354)	370	1,431		1,801	365	1,426		1,791
7 PLANT HELD		0				0				0			0			0		0		0
8 PLANT LEASED		0				0				0			0			0		0		0
9 GENERAL PLANT		40,046	40,046		62,924	62,924			65,263	65,263			67,342	67,342					58,288	58,288
10 TOTAL BPA	18,052	37,919	40,046	96,017	37,041	58,829	62,924	158,794	64,287	22,409	65,263	151,959	82,121	85,876	67,342	235,339	98,579	96,811	58,288	253,678

**SEGMENTED BPA PLANT INVESTMENT 9/30/98  
AND ACCUMULATED DEPRECIATION ALLOCATION  
(\$ IN THOUSANDS)**

	A	B	C	E	F	G	H	I	J	K	L	M
	GENER INTEG	NETWORK	SOUTH INTER	EAST INTER	UTIL DELIV	DSI	MTRNG AND GN PLNT	CONTROL EQUIP	PLANT LEASED	EMRGCY SPRS & PT SBS	OTHR PLNT	TOTAL 9.30.95
1. SUBSTATIONS	43,361	1,292,779	470,554	23,866	88,283	88,154	37,009	60,337	4	18,103		2,122,450
2. METERING STATIONS							8,332					8,332
3. SUB TOTAL	43,361	1,292,779	470,554	23,866	88,283	88,154	45,341	60,337	4	18,103		2,130,782
4. EMRGNCY SPARES & PORT SUBS 1/	460	13,717	1,573	0	937	935	481			(18,103)		0
5. TOTAL SUBSTATIONS	43,821	1,306,496	472,127	23,866	89,220	89,089	45,822	60,337	4			2,130,782
6. ACCUMULATED DEPRECIATION	(4,695)	(139,970)	(96,972)	(5,795)	(9,559)	(9,545)	(4,909)	(6,464)	(4)			(277,913)
7. NET SUBSTATIONS	39,126	1,166,526	375,155	18,071	79,661	79,544	40,913	53,873	0			1,852,869
8. LINES (INCL LEASD/OTHERS)	16,557	1,651,410	197,378	97,890	31	0			185			1,963,451
9. ACCUMULATED DEPRECIATION	(10,727)	(1,069,952)	(74,271)	(41,637)	(20)	0			(175)			(1,196,782)
10. NET LINES	5,830	581,458	123,107	56,253	11	0			10			766,669
11. GENERAL PLANT							683,078					683,078
12. ACCUMULATED DEPRECIATION							(201,007)					(201,007)
13. NET GENERAL PLANT							239,268					239,268
14. OTHER PHYSICAL PLANT (LAND) 2/										39		39
15. PLANT FOR FUTURE USE (LAND)										3,245		3,245
16. TOTAL COMPLETED PLANT	60,378	2,957,906	669,505	121,756	89,251	89,089	728,900	60,337	189	0	3,284	4,780,595
17. TOTAL BPA COMPLETED PLANT 3/	60,378	2,957,906	669,505	121,756	89,251	89,089	728,900	60,337	189		3,245	4,780,556
18. ACCUMULATED DEPRECIATION	(15,422)	(1,209,922)	(171,243)	(47,432)	(9,579)	(9,545)	(205,916)	(6,464)	(179)		0	(1,675,702)
19. NET COMPLETED PLANT	44,956	1,747,984	498,262	74,324	79,672	79,544	522,984	53,873	10		3,245	3,104,854

1/ ALLOCATED TO SEGMENTS BY SUBSTATION INVESTMENT.

2/ NON-DEPRECIABLE LAND.

3/ DOES NOT INCLUDE NON-DEPRECIABLE LAND.

**MONTANA INTERTIE  
GARRISON SUBSTATION**

YEAR	INVESTMENT	LIFE	ANNUAL EXPENSE	AGE	ACCUM DEP
1984	23674	59	401	14.5	5815
1985	-10424	59	-177	13.5	-2390
1987	7855	59	133	11.5	1530
1988	-1588	59	-27	10.5	-284
1990	173	59	3	8.5	26
1991	807	59	14	7.5	105
1993	545	59	9	5.5	50
1994	140	59	2	4.5	9
1997	1331	59	23	1.5	35
TOTAL	1998	22513			4896

**MONTANA INTERTIE  
COMMUNICATION EQUIPMENT FOR MONTANA INTERTIE**

YEAR	INVESTMENT	LIFE	ANNUAL EXPENSE	AGE	ACCUM DEP
1984	1353	22	62	14.5	899
TOTAL	1998	1353	62		899
		23866			5795

**SUBSTATIONS:** BIG EDDY, BUCKLEY, BAKEOVEN, FORT ROCK,  
 SAND SPRING, SYCAN, CELILO, CHIEF JOSEPH,  
 JOHN DAY, GRIZZLEY, MALIN, SUMMER LAKE,  
 (INC. SPARES)

YEAR	INVESTMENT	LIFE	ANNUAL EXPENSE	AGE	ACCUM	DEP
1968	9500	41	232	4.5	1044	
		37	257	5	1285	
		55	173	6	1038	
		59	161	15	2415	
1969	7970	41	194	3.5	679	
		37	215	5	1075	
		55	145	6	870	
		59	135	15	2025	
1970	56591	41	1380	2.5	3450	
		37	1529	5	7645	
		55	1029	6	6174	
		59	959	15	14385	
1975	613	37	17	2.5	43	
		55	11	6	66	
		59	10	15	150	
1978	482	55	9	5.5	50	
		59	8	15	120	
1979	1260	55	23	4.5	104	
		59	21	15	315	
1980	214	55	4	3.5	14	
		59	4	15	60	
1981	-247	55	-4	2.5	-10	
		59	-4	15	-60	
1982	264	55	5	1.5	8	
		59	4	15	60	
1983	11616	55	211	0.5	106	
		59	197	15	2955	
1985	54826	59	929	13.5	12542	
1986	5764	59	98	12.5	1225	
1987	4523	59	77	11.5	886	
1988	14905	57	261	10.5	2741	
1989	12170	57	214	9.5	2033	
1990	90060	57	1580	8.5	13430	
1991	21540	57	378	7.5	2835	
1992	66873	57	1173	6.5	7625	
1993	57157	57	1003	5.5	5517	
1994	5543	57	97	4.5	437	
1995	10375	57	182	3.5	637	
1997	37895	57	665	1.5	998	
TOTAL	1998		469894		96972	

**MONTANA INTERTIE**  
**TOWNSEND-GARRISON LINE**

YEAR	INVESTMENT	LIFE	ANNUAL EXPENSE	AGE	ACCUM DEP
1984	93987	34	2764	14.5	40078
1985	1148	34	34	13.5	459
1986	3112	34	92	12.5	1150
1987	-252	34	-4	11.5	-46
1988	-153	34	-2	10.5	-21
1989	-28	34	0	9.5	0
1990	102	34	2	8.5	17
1993	-25	34	0	5.5	0
TOTAL	1998	97891			41637

**SW INTERTIE**  
**LINES: BUCKLEY-SUMMER LAKE, CELILO-SYLMAR, BIG EDDY-**  
**CELILO, JOHN DAY-GRIZZLEY, JOHN DAY-BIG EDDY,**  
**GRIZZLEY-MALIN**

YEAR	INVESTMENT	LIFE	ANNUAL EXPENSE	AGE	ACCUM DEP
1968	39105	58	674	4.5	3033
		51	767	5	3835
		38	1029	6	6174
		34	1150	15	17250
1970	21315	58	368	2.5	920
		51	418	5	2090
		38	561	6	3366
		34	627	15	9405
1979	47	38	1	4.5	5
		34	1	15	15
1980	118	38	3	3.5	11
		33	4	15	60
1981	-70	38	-2	2.5	-5
		33	-2	15	-30
1983	27934	38	735	0.5	368
		33	846	15	12690
1985	772	33	23	13.5	311
1987	300	33	9	11.5	104
1988	171	33	5	10.5	53
1989	3813	33	116	9.5	1102
1990	365	33	11	8.5	94
1991	520	33	16	7.5	120
1993	39283	33	1190	5.5	6545
1994	158	33	5	4.5	23
1995	63432	33	1922	3.5	6727
1997	115	33	3	1.5	5
TOTAL	1998	197378			74271

## **CHAPTER 5**

### **PROJECTED CASH BALANCES/INTEREST CREDITS**

#### **I. Introduction**

This chapter projects BPA transmission business line's (TBL) cash balances for the rate period and estimates the interest income (credits) to be earned on of BPA's projected cash balances and on annual funds to be returned to Treasury. Included in TBL's projected cash balances are proceeds from the sale of Delivery segment facilities projected to be sold prior to the 2002-2003 rate period.

#### ***Interest credits on BPA's projected cash balances***

The risk model provides the risk-adjusted beginning rate period cash balance. The annual incremental cash provided from forecasted net revenues are added to this, for both revenue requirements and the revised revenue test. Using projected interest earnings rates, annual interest income is calculated from projected average annual cash balances. The resulting interest income is applied as a credit against interest expense in the transmission revenue requirements and in the income statement of the revised revenue test.

#### ***Interest income (repayment program calculation)***

Separately, interest income rates listed in this chapter are calculated and used within the repayment program to calculate an interest credit based on the average cash necessary to pay the interest, bond call premiums, and amortization payments calculated by the study for return to Treasury in that year. The repayment program assumes the cash accumulates at a uniform rate throughout the year, except for interest paid on bonds issued to Treasury at mid-year. At the end of the year, the cash balance, together with the interest credit earned thereon, is used in the program for payment of interest expense, amortization of the Federal investment, and payment of bond premiums. For a further explanation of the calculation of the interest credit computed

within repayment studies, *see* Revenue Requirement Study (TR-02-E-BPA-01), Appendix - The Repayment Program.

***Proceeds from projected sales of Delivery facilities***

As reflected in the Segmentation Study (TR-02-E-BPA-02), TBL has compiled a list of Delivery facilities expected to be sold prior to the 2002-2003 rate period. Book value was calculated for the Delivery facilities. TBL staff determined proceeds to be an average price of 25% over book value. The total book value was included in the beginning cash balance for the rate period to provide an interest credit comparable to the reduction in interest expense that would occur from retirement of an equivalent amount of transmission debt. This portion of the projected sales proceeds was not available for the risk analysis to use in determining Treasury payment probability. However, the amounts over book value were used by the risk analysis in determining the beginning rate period cash balance. Further, they were used to calculate interest credits directly applied to the respective delivery segments in the segmented revenue requirements.

**Interest Income from Projected Cash Balances**  
**Revenues from Proposed Rates**  
**BPA Transmission Business Line**  
**(\$ thousands)**

	<b>2002</b>	<b>2003</b>
1 Annual Cash Surplus/(Deficit)	17,379	28,779
2 Adjustments to Cash		
3 SOY Cash Balance 1/	73,117	95,953
4 EOY Cash Balance	90,496	124,733
5 Average Cash Balance	81,807	110,343
6 Interest Income Rate	6.67%	6.66%
7 Annual Interest Income	5,457	7,349
1/ Includes:		
Projected Proceeds = bv from sale of Delivery facilities	45,077	

**Interest Income from Projected Cash Balances**  
**BPA Transmission Business Line**  
**(*\$ thousands*)**

	<b>2002</b>	<b>2003</b>
1 Annual Cash Surplus/(Deficit)	24,877	33,722
2 Adjustments to Cash		
3 SOY Cash Balance 1/	73,117	97,994
4 EOY Cash Balance	97,994	131,716
5 Average Cash Balance	85,556	114,855
6 Interest Income Rate	6.67%	6.66%
7 Annual Interest Income	5,707	7,649
1/ Includes:		
Projected Proceeds = bv from sale of Delivery facilities (not available for risk) amounts over book value:	45,077	
Utility Delivery	5,634	
DSI Delivery	5,636	
Credits for Delivery Segments:		
Utility Delivery	376	375
DSI Delivery	376	375

## Projected Delivery Facility Sales, 2000-2001

(\$000)

<u>Utility Delivery</u>	<u>Book Value</u>		Total Facility	DSI Delivery
		<u>DSI Delivery</u>	<u>Book Value</u>	<u>Book Value</u>
Alderwood	480,000	Bell	32,900,000	11,420,000
Athol	438,000	Conkelly	9,215,000	4,828,000
Bayshore	162,000	Hanna	1,468,000	1,468,000
Benton City	214,000	Tacoma	9,694,000	2,637,000
Bigelow	204,000	Trentwood	3,929,000	2,190,000
Blue River	146,000			
Cheshire	1,056,000		<b>57,206,000</b>	<b>22,543,000</b>
Connell	162,000	25% of BV		<b>5,635,750</b>
Curlew	382,000			
Dayton	246,000			
Dexter	166,000			
East Hills	390,000			
Fern Ridge	53,000			
Fircrest	780,000			
Franklin	5,914,000			
Freewater	421,000			
Geisel Monument	39,000			
Green Bluff	40,000			
Harrisburg	114,000			
Haymill	884,000			
Kamilche	305,000			
Lopez Island	2,693,000			
McMinnville	201,000			
Mica	31,000			
Milton	230,000			
Minico	586,000			
Newcomb	173,000			
Oakridge	364,000			
Prosser	398,000			
Raft	309,000			
Rainbow Valley	100,000			
Riverton	349,000			
Riverview	562,000			
Roes Corner	1,678,000			
Sagehill	280,000			
Scarcello	821,000			
Snipes	239,000			
Taylor Flats	252,000			
Unity	294,000			
Winthrop	378,000			
<b>Total</b>	<b>\$22,534,000</b>			
<b>25% of BV</b>			<b>5,633,500</b>	

SEGMENTATION STUDY - Investment as of 9/30/98

<b>TOTAL INVESTMENT IN DSİ SUBS PROPOSED TO BE SOLD BY FY2002</b>					
<b>ID</b>	<b>NAME SUBS</b>	<b>SUB INVEST 98</b>	<b>AVG O&amp;M COSTS</b>	<b>SEGC</b>	
10605	Alcoa	6,338,949	377,748	D	
10605	Alcoa	2,781,718	559,877	N	
	<b>TOTAL</b>	<b>9,120,667</b>			
13271	Bell	14,545,296	34.71%	420,350	D
13271	Bell	27,363,003		1,138,521	N
	<b>TOTAL</b>	<b>41,908,299</b>			
41517	Conkelley	5,539,872	52.39%	384,612	D
41517	Conkelley	5,035,305		737,054	N
	<b>TOTAL</b>	<b>10,575,177</b>			
21031	Hanna	2,360,198		79,946	D
	<b>TOTAL</b>	<b>2,360,198</b>			
12775	Tacoma	3,890,334	27.20%	79,124	D
12775	Tacoma	10,412,285		211,770	N
	<b>TOTAL</b>	<b>14,302,619</b>			
13275	Trentwood	3,738,726	55.74%	105,742	D
13275	Trentwood	2,969,231		83,978	N
	<b>TOTAL</b>	<b>6,707,957</b>			
Data from preliminary segmentation study 11/16/99					

## **CHAPTER 6**

### **INTEREST RATES FOR TREASURY SOURCES OF CAPITAL**

### **AND PRICE DEFLATORS**

#### **Introduction**

Interest rates on bonds issued by BPA to Treasury are used in development of repayment studies and projections of Federal interest expense in revenue requirements. Price deflators are used for developing spending levels in revenue requirements.

#### ***WEFA***

The WEFA Group (WEFA) provides Treasury yield curve forecasts that BPA uses to project interest rates on bonds issued to Treasury. WEFA is also the source of price deflators that BPA treats as escalators for purposes of developing spending levels. The price deflators are derived from projections of Gross Domestic Product (GDP). The GDP consists of the sum of consumption, investment, government purchases and net exports, excluding transfers to foreigners.

#### ***Interest Rate Projections***

Projected interest rates for BPA bonds issued to Treasury are based on WEFA's yield curve projections of Treasury market rates, plus a markup of 32 to 90 basis points depending on the length of time to maturity. The markup estimate reflects an interagency agreement that Treasury price BPA bonds at a level comparable to securities (bonds) issued by U.S. government corporations. The markup estimate reflects the average basis point markup on recent intermediate and long-term bonds issued by BPA. As noted in the attached transmittal memo documenting the interest rates in this revenue requirement study, for the FY 2002-2003 period the 30-year rate reflects a markup of 90 basis points.

### ***Deflators***

The current and cumulative price deflator used to escalate midyear dollars are derived from the fiscal and calendar year price deflators provided by WEFA. They are calculated as follows:

$$[(FY_1/100) \times 0.5] + 1 = \text{Cumulative Price Deflator}_1$$

The fiscal year GDP price deflator for the current year is divided by one hundred and multiplied by one half. The result, when added to one, yields the cumulative price deflator for the first year.

$$[1 + (FY_t/100)] \times \text{Cumulative Price Deflator}_{t-1} = \text{Cumulative Price Deflator}_t, \text{ when } t > 1$$

The fiscal year GDP price deflator for a future year is divided by one hundred and added to one. The result, when multiplied by the cumulative price deflator from the previous year, yields the cumulative price deflator for the each successive year.

To the extent deflators are used in developing the FY 2002-2003 spending levels they are based on the price deflators from the Fourth Quarter 1997 WEFA forecast.

## InterOffice Memo

**Date:** April 16, 1998

**To:** Addressees

**From:** Robert Mealey, Financial Economist - CMD-2

THRU: David J. Armstrong, Manager, Corporate Risk Management - C-2

**Subject:** FY 1998.Q2 Updated WNP Long Term Debt Service Forecasts

---

The Second Quarter FY 1998 forecast of Supply System debt service is attached. It is used in BPA's Quarterly Financial Review, budget formulation, financial planning, and strategic analyses.

This forecast was prepared on April 2, 1998. It reflects recent Supply System refundings and revised investment income assumptions. The forecast does not include debt service associated with additional capital investments for WNP-2 that would be debt financed under BPA's capital funding policy (as determined in the 10-year Financial Plan). It is unlikely that new debt will be issued to finance WNP-2 capital additions.

The Second Quarter 1998 Forecast reduces net debt service by approximately \$69 million from BPA's Second Quarter 1997 forecast. (See Table 1.) Annual debt service declined on average by more than \$3 million to approximately \$489 million per year. Estimates of net debt service over the current rate case period, FY 1998-2001, fell by \$10 million, or almost \$2.5 million per year. Over this period debt service averaged \$583 million per year.

WNP debt service is projected to decline from BPA's 1996 Final Rate Case Proposal Forecast by approximately \$203 million, or almost \$10 million per year. (See Table 2.) Over the rate case period, FY 1998-2001, debt service is projected to decline approximately \$72 million, or approximately \$18 million per year from the 1996 Final Rate Case Proposal Forecast.

Several factors account for the decline in WNP net debt service since the Rate Case Forecast.

- ◆ Refunding efforts account for most of the drop in net debt service. Refunding efforts have reduced debt service estimates by approximately \$180 million, or \$8 million per year since the 1996 rate case forecast and \$113 million since BPA's 1997.Q2 forecast. This forecast reflects debt service savings generated by the 1997A, 1997B, 1998A refunding issues and the 1972A variable rate refunding that occurred on April 1, 1998.

- ◆ Estimates of investment income increased \$58 million from the 1996 Rate Case forecast, and \$11 million since BPA's FY 1997.Q2 forecast. Part of the increase reflects higher reserve fund estimates and revised estimates of investment earnings on short-term financial assets. Interest rates remain relatively unchanged in the FY 1998.Q2 debt service forecast. (See Chart 1) Revised interest rate assumptions are based on WEFA's forecast of U.S. Treasury yields (WEFA, Fourth Quarter, CY 1997 Long Term Economic Outlook, Trend Forecast)
- ◆ Other factors contributing to the decline in net debt service include slight gains in bond reserve free-ups balances, and reduction in R&C funding requirements.

Reductions to WNP debt service were partially offset by revised estimates of transfers from the Construction Fund and "other costs" not shown explicitly in the attached tables. Other costs such as Treasury Services and incidental financing costs are reflected implicitly in estimates of total debt service.

Annual net debt service peaks in FY 1999 at approximately \$612 million, and remains generally in excess of \$600 million through FY 2001. (See Table 3.) In FY 2002 net debt service drops to \$529 million and ranges around \$550 million until 2012. After the retirement of WNP-2 debt in FY 2012, net debt service drops to about \$350 million annually. Net debt service requirements for WNP-1, WNP-2, and WNP-3 are shown on Charts 2-5 and Tables 4-6. The estimates do not reflect BPA's debt service reduction target of \$20 million per year over the Rate Case period, FY 2002-2006. These expected savings will be shown separately in BPA's current Rate Case.

Addresses:

M. DeWolf-CM-2  
 D. Armstrong-C-2  
 A. Mertsching-CMD-2  
 C. Andrews-CMF-2  
 M. Chang-CMR-2  
 V. Lefler-CMR-2  
 R. Homenick-CMR-2  
 D. Carbonari-CMD-2  
 S. Dunne-CMD-2  
 K. Wood-CRO-2  
 M. Hawkin-CRB-2  
 J. Matkevich-CRB-2  
 E. Brost-PGCM/Richland  
 D. Grover Sandlin-PBCM/Richland  
 D. Steele-PB-6  
 K. Suckow-PB-6  
 G. Moorman-PM-6  
 K. Kintz-PM-6

TABLE 1

**30 YEAR TREASURY YIELDS**  
**FY 1998.Q2 FORECAST OF BPA TREASURY BORROWING RATES**

Calendar/Fiscal Years 1997 - 2019

<u>YEAR</u>	<u>BOND RATE 1/ Calendar Year</u>	<u>BOND RATE Fiscal Year</u>	<u>BPA RATE 2/ Fiscal Year</u>
1997	6.62%	6.64%	7.54%
1998	6.62%	6.62%	7.52%
1999	6.75%	6.72%	7.62%
2000	6.60%	6.64%	7.54%
2001	6.32%	6.39%	7.29%
2002	6.14%	6.18%	7.08%
2003	5.94%	5.99%	6.89%
2004	6.01%	6.00%	6.90%
2005	5.97%	5.98%	6.88%
2006	5.94%	5.95%	6.85%
2007	5.90%	5.91%	6.81%
2008	5.86%	5.87%	6.77%
2009	5.81%	5.82%	6.72%
2010	5.76%	5.77%	6.67%
2011	5.75%	5.75%	6.65%
2012	5.74%	5.74%	6.64%
2013	5.74%	5.74%	6.64%
2014	5.74%	5.74%	6.64%
2015	5.75%	5.75%	6.65%
2016	5.76%	5.76%	6.66%
2017	5.76%	5.76%	6.66%
2018	5.77%	5.77%	6.67%
2019	5.77%	5.77%	6.67%

1/ Source: The WEFA Group, U.S. Long-Term Economic Outlook, Fourth Quarter 1997, Volume 1 Trend\Moderate Growth Scenario. Average market yield on 30-year Treasury bonds. Calendar year adjusted to reflect BPA fiscal year.

2/ Column C = Column B + markup of 90 bp. The Treasury markup is based on the average rate of BPA long term bonds issued to the U.S. Treasury in FY 1993, 1994 and 1995, and adjustments by BPA Treasury analyst.

TABLE 2

**30 YEAR TREASURY YIELDS**  
**FY 1998.Q2 COMPARISON OF BPA BORROWING RATES**

Fiscal Years 1997 - 2019

<u>YEAR</u>	<u>FY 1998 Q.2 FORECAST</u>	<u>FY 1998 Q.2 FORECAST</u>	<u>DIFFERENCE</u>
	<u>BPA RATE 1/</u>	<u>BPA RATE 2/</u>	<u>(A-B)</u>
1997	7.54%	7.35%	0.19%
1998	7.52%	7.16%	0.36%
1999	7.62%	7.05%	0.57%
2000	7.54%	6.94%	0.60%
2001	7.29%	6.83%	0.46%
2002	7.08%	6.77%	0.31%
2003	6.89%	6.74%	0.15%
2004	6.90%	6.71%	0.19%
2005	6.88%	6.69%	0.19%
2006	6.85%	6.67%	0.18%
2007	6.81%	6.67%	0.14%
2008	6.77%	6.66%	0.11%
2009	6.72%	6.64%	0.08%
2010	6.67%	6.67%	0.00%
2011	6.65%	6.72%	-0.07%
2012	6.64%	6.75%	-0.11%
2013	6.64%	6.72%	-0.08%
2014	6.64%	6.71%	-0.07%
2015	6.65%	6.73%	-0.08%
2016	6.66%	6.72%	-0.06%
2017	6.66%	6.71%	-0.05%
2018	6.67%	6.72%	-0.05%
2019	6.67%	6.73%	-0.06%

1/ Forecast prepared February 20, 1998. Source: The WEFA Group, U.S. Long-Term Economic Outlook, Fourth Quarter 1997, Volume 1 Trend\Moderate Growth Scenario. Average market yield on 30-year Treasury bonds. Calendar year adjusted to reflect BPA fiscal year.

2/ Source: The WEFA Group, U.S. Long-Term Economic Outlook, Fourth Quarter 1996, Volume 1 Trend\Moderate Growth Scenario. Average market yield on 30-year Treasury bonds. Calendar year adjusted to reflect BPA fiscal year.

TABLE 3

**15 YEAR TREASURY YIELDS**  
**FY 1998.Q2 FORECAST OF BPA TREASURY BORROWING RATES**

Calendar/Fiscal Years 1997 - 2019

<u>YEAR</u>	(A) <u>BOND RATE 1/ Calendar Year</u>	(B) <u>BOND RATE Fiscal Year</u>	(C) <u>BPA RATE 2/ Fiscal Year</u>
1997	6.43%	6.45%	7.14%
1998	6.49%	6.48%	7.17%
1999	6.66%	6.62%	7.31%
2000	6.52%	6.55%	7.24%
2001	6.17%	6.24%	6.93%
2002	5.95%	6.00%	6.69%
2003	5.76%	5.81%	6.50%
2004	5.81%	5.79%	6.48%
2005	5.73%	5.75%	6.44%
2006	5.68%	5.69%	6.38%
2007	5.64%	5.65%	6.34%
2008	5.58%	5.60%	6.29%
2009	5.53%	5.54%	6.23%
2010	5.48%	5.49%	6.18%
2011	5.47%	5.47%	6.16%
2012	5.46%	5.46%	6.15%
2013	5.46%	5.46%	6.15%
2014	5.46%	5.46%	6.15%
2015	5.47%	5.47%	6.16%
2016	5.48%	5.48%	6.17%
2017	5.48%	5.48%	6.17%
2018	5.49%	5.49%	6.18%
2019	5.49%	5.49%	6.18%

1/ Source: The WEFA Group, U.S. Long-Term Economic Outlook, Fourth Quarter 1997, Volume 1 Trend\Moderate Growth Scenario. Average market yield on 15-year Treasury bonds.  
 Calendar year adjusted to reflect BPA fiscal year.

2/ Column C = Column B + markup of 69 bp. The Treasury markup is based on the average rate of BPA long term bonds issued to the U.S. Treasury in FY 1993, 1994 and 1995, and adjustments by BPA Treasury analyst.

TABLE 4

**20 YEAR TREASURY YIELDS**  
**FY 1998.Q2 FORECAST OF BPA TREASURY BORROWING RATES**

Calendar/Fiscal Years 1997 - 2019

<u>YEAR</u>	<u>BOND RATE 1/ Calendar Year</u>	<u>BOND RATE Fiscal Year</u>	<u>BPA RATE 2/ Fiscal Year</u>
1997	6.50%	6.52%	7.34%
1998	6.54%	6.53%	7.35%
1999	6.69%	6.65%	7.47%
2000	6.54%	6.58%	7.40%
2001	6.20%	6.29%	7.11%
2002	6.02%	6.06%	6.88%
2003	5.82%	5.87%	6.69%
2004	5.87%	5.86%	6.68%
2005	5.81%	5.83%	6.65%
2006	5.77%	5.78%	6.60%
2007	5.73%	5.74%	6.56%
2008	5.68%	5.69%	6.51%
2009	5.62%	5.63%	6.45%
2010	5.58%	5.59%	6.41%
2011	5.56%	5.57%	6.39%
2012	5.55%	5.56%	6.38%
2013	5.55%	5.55%	6.37%
2014	5.56%	5.56%	6.38%
2015	5.56%	5.56%	6.38%
2016	5.57%	5.57%	6.39%
2017	5.58%	5.58%	6.40%
2018	5.58%	5.58%	6.40%
2019	5.58%	5.58%	6.40%

1/ Source: The WEFA Group, U.S. Long-Term Economic Outlook, Fourth Quarter 1997, Volume 1 Trend\Moderate Growth Scenario. Average market yield on 20-year Treasury bonds.  
 Calendar year adjusted to reflect BPA fiscal year.

2/ Column C = Column B + markup of 82 bp. The Treasury markup is based on the average rate of BPA long term bonds issued to the U.S. Treasury in FY 1993, 1994 and 1995, and adjustments by BPA Treasury analyst.

TABLE 5  
FY 1998.Q2 FORECAST OF BPA TREASURY BORROWING RATES  
FORECAST PREPARED FEBRUARY 20, 1998

Fiscal Years 1997 - 2019

<u>Year</u>	<u>1 Year</u>	<u>2 Year</u>	<u>3 Year</u>	<u>4 Year</u>	<u>5 Year</u>	<u>6 Year</u>	<u>7 Year</u>	<u>8 Year</u>	<u>9 Year</u>	<u>10 Year</u>	<u>11 Year</u>	<u>12 Year</u>	<u>13 Year</u>	<u>14 Year</u>	<u>15 Year</u>
1997	5.92	6.19	6.45	6.55	6.65	6.73	6.82	6.89	6.90	6.95	6.98	7.02	7.06	7.10	7.14
1998	6.18	6.40	6.62	6.68	6.75	6.82	6.89	6.92	6.95	6.98	7.02	7.06	7.09	7.13	7.17
1999	6.41	6.59	6.77	6.84	6.91	6.97	7.03	7.07	7.10	7.14	7.18	7.21	7.24	7.27	7.31
2000	6.26	6.43	6.60	6.68	6.77	6.83	6.89	6.95	7.02	7.08	7.11	7.14	7.18	7.21	7.24
2001	5.88	6.05	6.23	6.30	6.38	6.44	6.50	6.58	6.66	6.74	6.78	6.82	6.85	6.89	6.92
2002	5.74	5.91	6.08	6.15	6.22	6.28	6.34	6.39	6.45	6.50	6.54	6.58	6.61	6.65	6.69
2003	5.56	5.75	5.93	6.00	6.07	6.12	6.18	6.22	6.26	6.30	6.34	6.38	6.42	6.46	6.50
2004	5.69	5.81	5.92	5.98	6.04	6.10	6.16	6.20	6.24	6.28	6.32	6.36	6.40	6.44	6.48
2005	5.73	5.81	5.89	5.94	5.99	6.04	6.10	6.15	6.19	6.23	6.27	6.32	6.36	6.40	6.44
2006	5.70	5.77	5.83	5.87	5.91	5.97	6.03	6.08	6.12	6.16	6.21	6.25	6.27	6.34	6.38
2007	5.65	5.71	5.78	5.82	5.86	5.92	5.98	6.02	6.07	6.12	6.16	6.20	6.25	6.29	6.34
2008	5.56	5.63	5.71	5.75	5.80	5.86	5.92	5.97	6.02	6.06	6.11	6.15	6.20	6.24	6.29
2009	5.46	5.55	5.63	5.68	5.73	5.80	5.86	5.91	5.96	6.01	6.05	6.10	6.14	6.19	6.23
2010	5.38	5.47	5.57	5.62	5.68	5.75	5.81	5.86	5.91	5.96	6.00	6.05	6.09	6.14	6.18
2011	5.35	5.45	5.55	5.61	5.66	5.73	5.80	5.84	5.89	5.94	5.98	6.03	6.07	6.12	6.16
2012	5.33	5.43	5.54	5.59	5.65	5.72	5.78	5.83	5.88	5.93	5.97	6.02	6.06	6.11	6.15
2013	5.32	5.42	5.53	5.58	5.64	5.71	5.78	5.83	5.87	5.92	5.97	6.01	6.06	6.10	6.15
2014	5.32	5.42	5.53	5.58	5.64	5.71	5.78	5.83	5.88	5.93	5.97	6.02	6.06	6.11	6.15
2015	5.33	5.43	5.53	5.58	5.64	5.71	5.78	5.83	5.88	5.93	5.97	6.02	6.06	6.11	6.16
2016	5.34	5.44	5.54	5.60	5.65	5.72	5.79	5.84	5.89	5.94	5.98	6.03	6.07	6.12	6.17
2017	5.35	5.45	5.55	5.61	5.66	5.73	5.80	5.85	5.90	5.95	5.99	6.04	6.08	6.13	6.17
2018	5.36	5.46	5.56	5.61	5.67	5.74	5.81	5.85	5.90	5.95	6.00	6.04	6.09	6.13	6.18
2019	5.36	5.46	5.56	5.62	5.67	5.74	5.81	5.86	5.91	5.95	6.00	6.04	6.09	6.13	6.18

<u>16 Year</u>	<u>17 Year</u>	<u>18 Year</u>	<u>19 Year</u>	<u>20 Year</u>	<u>21 Year</u>	<u>22 Year</u>	<u>23 Year</u>	<u>24 Year</u>	<u>25 Year</u>	<u>26 Year</u>	<u>27 Year</u>	<u>28 Year</u>	<u>29 Year</u>	<u>30 Year</u>	<u>50 Year</u>	<u>Year</u>
7.18	7.22	7.27	7.30	7.34	7.36	7.38	7.40	7.42	7.44	7.46	7.48	7.50	7.52	7.54	7.54	1997
7.20	7.24	7.27	7.31	7.35	7.36	7.38	7.40	7.42	7.43	7.45	7.47	7.49	7.51	7.52	7.52	1998
7.34	7.37	7.41	7.44	7.47	7.49	7.50	7.52	7.53	7.54	7.56	7.57	7.59	7.60	7.62	7.62	1999
7.27	7.30	7.34	7.37	7.40	7.42	7.43	7.44	7.46	7.47	7.48	7.50	7.51	7.53	7.54	7.54	2000
6.96	7.00	7.03	7.07	7.11	7.12	7.14	7.16	7.18	7.20	7.22	7.23	7.25	7.27	7.29	7.29	2001
6.73	6.77	6.81	6.84	6.88	6.90	6.92	6.94	6.96	6.98	7.00	7.02	7.04	7.06	7.08	7.08	2002
6.54	6.54	6.61	6.65	6.69	6.71	6.73	6.75	6.77	6.79	6.81	6.83	6.85	6.87	6.89	6.89	2003
6.52	6.56	6.60	6.64	6.68	6.70	6.72	6.75	6.77	6.79	6.81	6.83	6.85	6.87	6.90	6.90	2004
6.48	6.52	6.57	6.61	6.65	6.67	6.70	6.72	6.74	6.77	6.79	6.81	6.84	6.86	6.88	6.88	2005
6.42	6.47	6.51	6.55	6.60	6.62	6.65	6.67	6.7	6.72	6.75	6.77	6.80	6.82	6.85	6.85	2006
6.38	6.42	6.47	6.51	6.56	6.58	6.61	6.63	6.66	6.68	6.71	6.74	6.76	6.79	6.81	6.81	2007
6.33	6.38	6.42	6.46	6.51	6.53	6.56	6.59	6.61	6.64	6.67	6.69	6.72	6.74	6.77	6.77	2008
6.28	6.32	6.36	6.41	6.45	6.48	6.51	6.53	6.56	6.59	6.61	6.64	6.67	6.69	6.72	6.72	2009
6.23	6.27	6.32	6.36	6.41	6.43	6.46	6.49	6.51	6.54	6.57	6.59	6.62	6.65	6.67	6.67	2010
6.21	6.25	6.30	6.34	6.39	6.41	6.44	6.47	6.49	6.52	6.55	6.57	6.60	6.63	6.65	6.65	2011
6.20	6.24	6.29	6.33	6.38	6.40	6.43	6.46	6.48	6.51	6.54	6.56	6.59	6.62	6.64	6.64	2012
6.19	6.24	6.28	6.33	6.37	6.40	6.43	6.45	6.48	6.51	6.53	6.56	6.59	6.61	6.64	6.64	2013
6.20	6.24	6.29	6.33	6.38	6.40	6.43	6.46	6.48	6.51	6.54	6.56	6.59	6.62	6.64	6.64	2014
6.20	6.24	6.29	6.34	6.38	6.41	6.43	6.46	6349	6.52	6.54	6.57	6.60	6.62	6.65	6.65	2015
6.21	6.25	6.30	6.34	6.39	6.42	6.44	6.47	6.50	6.52	6.55	6.58	6.60	6.63	6.66	6.66	2016
6.22	6.26	6.31	6.35	6.40	6.42	6.45	6.48	6.50	6.53	6.56	6.58	6.61	6.64	6.66	6.66	2017
6.22	6.27	6.31	6.36	6.40	6.43	6.45	6.48	6.51	6.53	6.56	6.59	6.61	6.64	6.67	6.67	2018
6.22	6.27	6.31	6.36	6.40	6.43	6.46	6.48	6.51	6.54	6.56	6.59	6.62	6.64	6.67	6.67	2019

TABLE 6

**FY 1998.Q2 FORECAST OF INFLATIONARY TRENDS  
CHANGE IN GROSS DOMESTIC PRODUCT PRICE DEFULATOR**

Calendar/Fiscal Year

<u>Year</u>	<u>(A)</u> <u>CALENDAR YEAR</u>	<u>(B)</u> <u>FY 98 Q.2</u>	<u>(C)</u> <u>FISCAL YEAR</u>	<u>(D)</u> <u>FISCAL YEAR</u>	<u>(E)</u> <u>FISCAL YEAR</u>	<u>(F)</u> <u>FISCAL YEAR</u>	<u>(G)</u> <u>FISCAL YEAR</u>
	<u>% CHANGE 1/</u>	<u>FISCAL YEAR</u> <u>% CHANGE</u>	<u>CUMULATIVE PRICE</u> <u>DEFLATOR INDEX 2/</u> <u>(1994 Base Year)</u>	<u>CUMULATIVE PRICE</u> <u>DEFLATOR INDEX</u> <u>(1995 Base Year)</u>	<u>CUMULATIVE PRICE</u> <u>DEFLATOR INDEX</u> <u>(1996 Base Year)</u>	<u>CUMULATIVE PRICE</u> <u>DEFLATOR INDEX</u> <u>(1997 Base Year)</u>	<u>CUMULATIVE PRICE</u> <u>DEFLATOR INDEX</u> <u>(1998 Base Year)</u>
1994	2.38%	2.45%	1.012				
1995	2.54%	2.50%	1.038	1.013			
1996	2.29%	2.35%	1.062	1.036	1.012		
1997	2.04%	2.10%	1.084	1.058	1.033	1.010	
1998	1.98%	2.00%	1.106	1.079	1.054	1.031	1.010
1999	6.62%	2.46%	1.133	1.106	1.080	1.056	1.035
2000	2.52%	2.54%	1.162	1.134	1.107	1.083	1.061
2001	2.46%	2.48%	1.191	1.162	1.134	1.110	1.087
2002	2.50%	2.49%	1.220	1.191	1.163	1.137	1.115
2003	2.80%	2.73%	1.254	1.223	1.194	1.168	1.145
2004	2.67%	2.70%	1.287	1.256	1.227	1.200	1.176
2005	2.67%	2.67%	1.322	1.290	1.259	1.232	1.207
2006	2.51%	2.55%	1.356	1.323	1.291	1.263	1.238
2007	2.48%	2.49%	1.389	1.356	1.324	1.295	1.269
2008	2.53%	2.51%	1.424	1.390	1.357	1.327	1.301
2009	2.56%	2.55%	1.461	1.425	1.391	1.361	1.334
2010	2.60%	2.59%	1.498	1.462	1.428	1.397	1.368
2011	2.57%	2.58%	1.537	1.500	1.464	1.433	1.404
2012	2.63%	2.62%	1.577	1.539	1.503	1.470	1.441
2013	2.67%	2.66%	1.619	1.580	1.543	1.509	1.479
2014	2.66%	2.66%	1.662	1.622	1.584	1.549	1.518
2015	2.70%	2.69%	1.707	1.666	1.626	1.591	1.559
2016	2.70%	2.70%	1.753	1.711	1.670	1.634	1.601
2017	2.68%	2.69%	1.800	1.757	1.715	1.678	1.644
2018	2.70%	2.70%	1.849	1.804	1.762	1.723	1.890
2019	2.71%	2.71%	1.899	1.853	1.809	1.770	1.734

1/ Source: WEFA Fourth Quarter 1997 U.S. Long-Term Economic Outlook, Gross Domestic Product Implicit Price Deflator Index, Calendar Year. Base year Index = 1992

2/ Fiscal Year Cumulative Price Deflator associates to midyear dollars. The first year, 1994, is determined as follows:  $1.0118 = [(2.363\% / 100) * 0.5] + 1$ . Subsequent years use the prior Fiscal Year Cumulative Price Deflator . For example, the rate in 1995 is given by:  $1.036 = [1 + (2.363\% / 100)] * 1.0118$ .

TABLE 7

**FY 1998.Q2 INFLATION FORECAST COMPARISONS**  
**GROSS DOMESTIC PRODUCT PRICE DEFLATOR INDEXES**

Year	BPA Fiscal Year		
	(A)	(B)	(C)
	FY 98.Q2 1/ FISCAL YEAR CUMULATIVE PRICE DEFLATOR INDEX (1994 Base Year)	FY 97.Q1 2/ FISCAL YEAR CUMULATIVE PRICE DEFLATOR INDEX (1994 Base Year)	(A-B) <u>Difference</u>
1994	1.012	1.012	0.000
1995	1.038	1.037	0.001
1996	1.062	1.060	0.002
1997	1.084	1.084	0.000
1998	1.106	1.111	-0.005
1999	1.133	1.139	-0.006
2000	1.162	1.169	-0.007
2001	1.191	1.199	-0.008
2002	1.220	1.231	-0.011
2003	1.254	1.263	-0.009
2004	1.287	1.297	-0.010
2005	1.322	1.331	-0.009
2006	1.356	1.367	-0.011
2007	1.389	1.404	-0.015
2008	1.424	1.441	-0.017
2009	1.461	1.479	-0.018
2010	1.498	1.518	-0.020
2011	1.537	1.558	-0.021
2012	1.577	1.600	-0.023
2013	1.619	1.643	-0.024
2014	1.662	1.688	-0.026
2015	1.707	1.734	-0.027
2016	1.753	1.781	-0.028
2017	1.800	1.828	-0.028
2018	1.849	1.875	-0.026
2019	1.899	1.923	-0.024

1/ Source: WEFA Fourth Quarter 1997 U.S. Long-Term Economic Outlook,  
Gross Domestic Product Price Deflator Index, Calendar Year. Base year index = 1992.

2/ Source: WEFA Fourth Quarter 1996 U.S. Long-Term Economic Outlook,  
Gross Domestic Product Price Deflator Index.

## **CHAPTER 7**

### **PROJECTED NEW BONDS ISSUED TO TREASURY**

Purpose: To provide the projected bonds that BPA plans to issue to the U.S. Treasury to finance BPA capital investments.

Method: New long-term debt consist of bonds issued by BPA to Treasury reflecting actual and projected outlays for BPA Transmission and Environmental programs during the cost evaluation period. New debt for FY 2000 reflects projected bonds issued. All bonds projected for issuance are entered into the projected portions of the repayment study.

Application of Methodology: Projections for new bonds issued to Treasury in FY 2000 are consistent with BPA's Second Quarter Review and are based on a FY 2000 Borrowing Analysis. New bonds for the remainder of the cost evaluation period (FYs 2002-03) are based on projected BPA capital program outlays.

# TBL CAPITAL BUDGET PROJECTION

**INFLATED DOLLARS - \$(000)**

## FY 2000 - FY 2003 TARGET SETTING PROJECTIONS

	OMB01 FY2000	OMB01 FY2001	OMB01 FY2002	OMB01 FY2003
<b>TOTAL TBL CAPITAL (DIRECT)</b>	122,327.6	173,536.2	205,344.2	201,606.4
<b>INDIRECTS</b>				
Total TBL Indirects	20,480.0	20,860.0	21,540.0	22,080.0
<b>AFUDC<sup>1</sup></b>				
Total AFUDC	4,390.0	4,691.0	5,040.0	5,225.0
<b>CORPORATE OVERHEAD<sup>2</sup></b>				
Total Corporate Overhead	11,575.3	10,880.8	7,754.4	7,728.0
<b>TOTAL TBL CAPITAL</b>	158,772.9	209,968.0	239,678.6	236,639.4
<b>Adjustments</b>				
Fiber <sup>3</sup>		(11,900.0)	(10,000.0)	(1,100.0)
Deferred Borrowing	21,151.0			
Corporate Capital Allocated to TBL	9,669.0	3,536.0	3,506.0	3,592.0
<b>ZABF</b>	189,592.9	201,604.0	233,184.6	239,131.4
<b>ENVIRONMENT</b>				
Total Environment	9,086.1	9,086.1	9,046.8	9,273.6
Adjustments- deferred borrowing	10,517.4			
<b>ZAFW</b>	19,603.5	9,086.1	9,046.8	9,273.6

1/ used Ron's calculations

2/ Corporate overhead amounts are consistent with those being used in the the Power rate case,  
per conversations with D. Barringer and C. Andrews 6/29/99.

3/ Changes to Fiber Budget for Presidential Budget

Notes: ZABF bonds - 35 years

ZAFW bonds - 15 years

Repayment study reflects actual 1999 borrowing for transmission programs, while other areas of the case start with 1998 actuals.

**BPA Projected Transmission Federal Borrowing**  
**FY 2000- 2003 1/**  
**(\$ Thousands)**

<b><u>FY Year</u></b>	<b><u>Description</u></b>	<b><u>Interest Rate</u></b>	<b><u>Term</u></b>	<b><u>Total Borrowing</u></b>
2000	Construction 2/	6.40	3	40,000
	Construction	7.54	35	189,593
	Construction	7.54	31	15,323
	Environmental	7.24	15	<u>19,603</u>
				264,519
2001	Construction	7.29	35	201,604
	Environmental	6.92	15	<u>9,086</u>
				210,690
2002	Construction	7.08	35	233,185
	Environmental	6.69	15	<u>9,047</u>
				242,232
2003	Construction	6.89	45	239,131
	Environmental	6.50	15	<u>9,274</u>
				248,405

1/ Projected borrowing over the cost evaluation period includes FYs 2000-03.

2/ On 11/30/99, \$40 million construction bond was issued.

**TABLE C-2**  
**Association of Transmission Construction**  
**Funded by Bonds 1/**  
**FY 1977 - FY 1990**  
**(\$ Thousands)**

(A) <u>Fiscal Year</u>	(B) <u>Plant in Service</u>	(C) <u>Amount Funded by Bonds</u>	(D) <u>Amount of Bond Sales</u>	(E) <u>Amount Outstanding</u>	(F) <u>Interest Rate</u>	(G) <u>Term</u>	(H) <u>Year Due</u>	(I)	(J)
1977	171,038	100,800 3/							
		50,000							
		20,238							
		<u>171,038</u>							
1978	90,494	54,762	50,000	0	8.95	35	2013		
		35,732							
		<u>90,494</u>							
1979	67,649	14,268	75,000	0	9.45	35	2014		
		53,381	50,000	0	9.90	35	2014		
		<u>67,649</u>							
1980	48,043	48,043	115,000	0	13.00	35	2015		
1981	253,151	13,576	175,000	0	16.60	35	2016		
		175,000							
		50,000							
		<u>14,575</u>							
		<u>253,151</u>							
1982	92,111	85,425	50,000	0	14.40	35	2017		
		6,686	100,000	0	14.40	35	2017		
		<u>92,111</u>	85,000	0	14.15	35	2017	7/31/87	85,000 4/
1983	149,133	78,314	40,000	0	10.85	35	2018	2/29/88	40,000 5/
		40,000	30,000	0	11.70	35	2018		
		30,000	45,000	0	12.25	35	2018		
		<u>819</u>							
		<u>149,133</u>							
1984	235,214	44,181	30,000	0	12.30	35	2019		
		30,000	60,000	0	13.05	35	2019		
		60,000							
		100,000							
		<u>1,033</u>							
		<u>235,214</u>							
1985	115,901	98,967	100,000	0	11.25	45	2030		
		16,934							
		<u>115,901</u>							
1986	326,694	283,066	100,000	100,000	8.15	10	1996	8/31/92	100,000 6/
		43,628	300,000	0	8.95	45	2031	8/31/92	100,000 7/
								5/31/94	40,000 8/
		<u>326,694</u>							
1987	167,781	56,372	100,000	0	9.30	45	2032	4/30/92	100,000 9/

(Con't)

**TABLE C-2**  
**Association of Transmission Construction**  
**Funded by Bonds 1/**  
**FY 1977 - FY 1990**  
**(\$ Thousands)**

(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)
<u>Fiscal Year</u>	<u>Plant in Service</u>	<u>Amount Funded by Bonds</u>	<u>Amount of Bond Sales</u>	<u>Amount Outstanding</u>	<u>Interest Rate</u>	<u>Term</u>	<u>Year Due</u>	<u>Refinancing</u>	
(Con't)		100,000 11,409 <u>167,781</u>	— 100,000 50,000 <u>167,781</u>	0 0 <u>0</u>	8.35 9.55 <u>9.55</u>	5 45 <u>45</u>	1992 2032 <u>2032</u>		
1988	96,878	38,591 58,287 <u>96,878</u>	150,000 40,000 <u>96,878</u>	0 0 <u>0</u>	9.50 9.90 <u>9.90</u>	45 45 <u>45</u>	2033 2033 <u>2033</u>	10/31/93 5/31/94 <u>10/31/93</u>	100,000 50,000 <u>100,000</u>
1989	211,811	91,713 40,000 75,000 5,098 <u>211,811</u>	75,000 <u>75,000</u>	75,000 <u>75,000</u>	8.95 <u>8.95</u>	10 <u>10</u>	1999 <u>1999</u>		10/ 11/ <u>10/</u>
1990	88,894	44,902 <u>43,992</u> <u>12/</u>	50,000 <u>50,000</u>	50,000 <u>50,000</u>	9.25 <u>9.25</u>	40 <u>40</u>	2030 <u>2030</u>		

- 1/ These investments have an estimated average service life of 45 years and a maximum repayment period of 45 years.
- 2/ BPA's Summary Financial data, Analysis of Funds Returned to the U.S Treasury and Cash Amortization Table, change in Total column from previous year.
- 3/ Funded by appropriations (Reference WP-89-E-BPA-01A1, Documentation for the Revenue Requirement Study - Volume 1, 1989 Rate Proposal, page 195).
- 4/ Refinanced on 7/31/87 with \$ 95,000 issued at 9.55%, 30 year term, due in 2017.
- 5/ Refinanced on 2/29/88 with \$43,700 issued at 9.50%, 30 year term, due in 2018.
- 6/ Refinanced on 8/31/92 with \$107,800 issued at 6.60%, 8 year term, due in 2000.
- 7/ Refinanced on 8/31/92 with \$107,700 issued at 7.25%, 15 year term, due in 2007.
- 8/ (See 11/)
- 9/ Refinanced on 4/30/92 with \$80,000 issued at 6.20%, 3 year term, due in 1995; and \$28,300 issued at 7.00%, 5 year term, due in 1997.
- 10/ Refinanced on 10/31/93 with \$108,400 issued at 6.85%, 40 year term, due in 2033.
- 11/ (And 8/) Refinanced on 5/31/94 with \$97,100 issued at 7.1%, 4 year term, due in 1998.
- 12/ See Association of Transmission Construction Functionalized to Transmission (Table C-2a)

**Association of Environment Investment**  
**Funded by Bonds**  
**FY 1995 - 1998**  
**( \$ Thousands)**

(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)
<u>Fiscal Year</u>	<u>Plant in Service</u>	<u>Amount Funded by 1/ Bonds</u>	<u>Amount of Bond Sales</u>	<u>Amount Outstanding</u>	<u>Interest Rate</u>	<u>Term</u>	<u>Year Due</u>	<u>Refinancing</u>	
1995	16,014	16,014	16,014	16,014	7.20	15	2010		
1996									
1997	40,000	40,000	40,000	40,000	6.95	15	2011		
1998									

1/ BPA's Summary Financial data, Analysis of Funds Returned to the U. S. Treasury and Cash Amortization Table, change in Total column from previous year.

## **CHAPTER 8**

### **REPLACEMENTS PROJECTED AFTER THE COST EVALUATION PERIOD**

Purpose: To project the amount of additional capital investment necessary to maintain an existing project at its current operating level after the Cost Evaluation Period.

Method: BPA uses the Iowa Curve Methodology to forecast replacements for the transmission system.

Application of Methodology: The repayment study incorporates a schedule of Federal investment with the replacements that are expected to occur over the repayment period for existing generation projects and transmission system. This schedule is expressed in mid-year dollars for FYs [2002 through 2003](#) and is based on the amount of the plant-in-service in the transmission system for BPA through the end of the cost evaluation period.

#### Transmission Replacements:

The Iowa Curve methodology is used to calculate future replacements for the transmission system. The Iowa Curves are a set of curves with different shapes corresponding to how much of the initial asset survives as a function of time. They are described in the book [Statistical Analyses of Industrial Property Retirements](#) by Robley Winfrey, bulletin 125 revised, Engineering Research Institute, Iowa State University. The Iowa Curves are initially used in BPA's depreciation. BPA's total plant, catalogued by FERC account and in-service date, was analyzed and the various FERC accounts were assigned to various Iowa Curves and lifetimes (see TABLE 1 - FINDINGS AND RECOMMENDATIONS ON DEPRECIATION EXPENSE, columns C and F).

A corresponding table from Winfrey's book, TABLE 22 - TOTAL RENEWALS FOR TYPE CURVES, tells what fraction of plant represented by a given curve will have to be replaced each tenth-of-lifetime to maintain the initial plant. A data file with the contents of that table accurate to twelve lifetimes has been created for use in calculating BPA's future transmission replacements (see TABLE 22). For each of the Iowa Curves Table 22 will call for replacements equal to about 50 percent of the initial plant in the first lifetime and approaching 100 percent of initial plant in later lifetimes.

Table 22 gives replacement plant in the same physical units as the initial plant. The net investment in plant of any historical year must first be converted to units of physical plant by dividing the investment by an appropriate historical cost per unit plant. BPA's plant cost is converted to quasi-physical units of plant by use of the Handy-Whitman Index. The Handy-Whitman Index provides cost trends for electric, gas, telephone, and water utilities in geographical regions of generally similar characteristics. The Handy-Whitman Index numbers are widely used in the industry to trend original cost records to estimate reproduction cost at prices prevailing at a later date. The cost trends for each of the utilities are further subdivided by type of plant. In particular, the cost trends for electrical utilities include trends for total transmission plant and trends for the major FERC accounts within transmission plant (see table entitled HANDY-WHITMAN INDICES). The trends for individual FERC accounts are used when available. The trends for total transmission plant are used for those accounts for which no specific trend is included.

Surviving transmission plant investment by FERC account and in-service year is obtained from BPA's Plant Investment Section (see years 1940 through 2001 of table entitled PLANT INVESTMENT BY YEAR AND FERC ACCOUNT). The plant investment of each year and account is divided by the corresponding Handy-Whitman number to obtain plant in quasi-physical units. The quasi-physical plant is then multiplied by factors obtained by interpolating in

the appropriate column of Table 22 to obtain quasi-physical replacements for all years from the last year of the Handy-Whitman index through the last year of the repayment period. The resulting quasi-physical units are multiplied by the Handy-Whitman number for the last year of the index for the corresponding FERC account to yield replacement costs in the dollars of that last year. These replacement costs are accumulated by future year and FERC account (see table entitled REPLACEMENTS BY INDIVIDUAL FERC ACCOUNTS).

Gross plant investment data for the cost evaluation period is obtained from BPA's Budget Support (see table entitled COST-EVALUATION PERIOD DATA). This latter plant is first de-escalated to the dollars of the last year of the Handy-Whitman index and then distributed among the various FERC accounts in the same proportions as the total plant of BPA's summary of BPA investment from plant balances as of September 30, 1995 (see years [2002](#) through [2003](#) of table entitled PLANT INVESTMENT BY YEAR AND FERC ACCOUNT). Some of the historical plant obtained from the Plant Investment Section will be retired during the cost evaluation period and be replaced with plant funded by amounts obtained from Budget Support. If future replacements were calculated for both, a double counting would occur. Therefore the amount budgeted for a cost evaluation period year is reduced by the amount calculated for replacements for the same year. Future replacements are then calculated for only the remaining net initial investment of that year (see table entitled ADJUSTED PLANT INVESTMENT BY YEAR AND FERC ACCOUNT).

The replacement costs of each future year and FERC account are then accumulated for all FERC accounts and inflated from the dollars of the most recent Handy-Whitman year to the dollars of the rate change year (see the table entitled FUTURE REPLACEMENTS).

Third AC Replacements:

Future replacements on the AC Intertie Facilities are calculated separately so that the contributions made toward those replacements by Non-Federal Capacity Owners can be properly credited in the repayment studies. For historical plant, the plant investment as of September 30, 1995 in each of the lines and substations composing the AC Intertie System (see LINES and SUBSTATIONS) was apportioned among the years on the basis of the same line or substation data in a recent plant investment file. These investments by year were accumulated for all lines and substations to obtain historical plant investment by year. These annual investments were apportioned among land and the major FERC accounts on the same basis as the total lines and substations (see table entitled AC INTERTIE PLANT-IN-SERVICE).

The cost-evaluation period data for the AC Intertie was obtained (see the table entitled Segmentation Summary). The resulting plant data was then processed by the replacement methodology as described above. Those listings that apply only to the AC Intertie follow those for the transmission system. The results are the future replacements for the total AC Intertie and have to be multiplied by the appropriate fraction, 21 percent, to obtain the future contributions required by new capacity owners. These fractional parts, together with the amounts budgeted for the cost evaluation period, are entered into the Transmission Repayment Studies as negative expenses in the Capital Contract Obligation field (*see* Chapter 10, transmission input data).

## **BPA REPLACEMENTS**

TABLE22 FROM 'STATISTICAL ANALYSES OF INDUSTRIAL PROPERTY RETIREMENTS' BY ROBLEY WINFREY, BULLETIN 125, IOWA STATE UNIVERSITY

	L0	L1	L2	L3	L4	L5	S0	S1	S2	S3	S4	S5	S6	R1	R2	R3	R4	R5
1	2.93	.95	.11	.00	.00	.00	1.17	.16	.00	.00	.00	.00	.00	2.78	1.14	.15	.02	.00
2	4.82	2.09	.68	.08	.00	.00	2.68	.89	.12	.00	.00	.00	.00	3.23	1.57	.40	.06	.00
3	5.92	3.64	1.60	.47	.00	.00	3.84	2.03	.58	.06	.00	.00	.00	3.69	2.12	.88	.19	.00
4	6.72	5.35	2.78	1.22	.16	.00	4.83	3.36	1.59	.38	.00	.00	.00	4.18	2.81	1.60	.51	.00
5	7.32	6.90	4.83	2.40	.95	.01	5.71	4.78	3.16	1.34	.10	.00	.00	4.76	3.67	2.59	1.18	.05
6	7.77	7.95	7.42	4.63	2.64	.46	6.52	6.17	5.18	3.32	.79	.02	.00	5.47	4.73	3.83	2.45	.46
7	8.18	8.45	9.50	8.28	5.00	2.64	7.25	7.48	7.39	6.36	3.28	.46	.00	6.31	6.01	5.37	4.53	1.96
8	8.54	8.82	10.62	12.11	8.66	6.70	7.94	8.63	9.49	10.00	8.66	4.05	.36	7.25	7.50	7.50	7.49	5.59
9	8.87	9.16	10.85	14.12	16.35	14.73	8.56	9.61	11.20	13.32	15.88	15.63	8.93	8.25	9.17	10.38	11.23	13.40
10	9.16	9.47	10.58	13.60	20.53	28.50	9.14	10.37	12.30	15.36	21.28	29.85	40.71	9.24	10.85	13.57	17.14	24.92
11	9.41	9.73	10.20	11.66	16.77	23.71	9.67	10.92	12.71	15.52	21.28	29.85	40.71	10.16	12.32	15.94	21.62	29.98
12	9.62	9.93	9.93	9.80	11.27	12.45	10.14	11.24	12.45	13.88	15.91	15.63	8.93	10.94	13.23	16.20	18.76	18.70
13	9.78	10.08	9.86	8.80	7.93	6.23	10.54	11.34	11.68	11.17	8.80	4.05	.36	11.52	13.26	13.79	11.69	4.71
14	9.92	10.18	9.94	8.70	6.40	3.26	10.86	11.24	10.64	8.49	3.79	.47	.00	11.84	12.34	9.97	5.69	.49
15	10.01	10.24	10.06	9.14	6.00	2.09	11.08	10.96	9.61	6.79	2.20	.14	.00	11.86	10.85	7.63	3.08	.65
16	10.08	10.25	10.16	9.76	6.57	2.78	11.20	10.54	8.84	6.50	3.31	.74	.01	11.56	9.54	6.34	3.94	1.78
17	10.12	10.24	10.19	10.26	8.12	5.42	11.17	10.05	8.52	7.44	6.10	2.95	.30	10.97	8.66	6.31	5.87	4.13
18	10.15	10.21	10.16	10.48	10.34	9.68	10.95	9.55	8.69	8.99	9.76	8.16	3.18	10.18	8.04	7.68	8.19	8.17
19	10.15	10.16	10.09	10.42	12.28	14.97	10.48	9.17	9.23	10.50	13.32	15.90	14.83	9.39	8.17	9.13	10.67	13.68
20	10.14	10.11	10.02	10.18	12.93	18.28	9.55	9.08	9.89	11.51	15.55	22.11	31.68	8.87	8.94	10.46	12.94	18.94
21	10.12	10.06	9.96	9.94	12.22	16.98	8.86	9.43	10.38	11.87	15.61	22.11	31.68	8.74	9.66	11.48	14.43	20.78
22	10.10	10.01	9.93	9.80	10.88	12.84	9.22	9.81	10.62	11.60	13.57	15.90	14.83	9.15	10.24	12.00	14.40	17.13
23	10.08	9.97	9.92	9.80	9.62	8.75	9.51	10.06	10.62	10.91	10.39	8.19	3.18	9.52	10.62	11.92	12.67	10.08
24	10.05	9.95	9.94	9.89	8.78	5.94	9.73	10.20	10.48	10.07	7.45	3.11	.30	9.84	10.79	11.29	10.00	4.35
25	10.03	9.94	9.96	10.00	8.47	4.73	9.90	10.26	10.25	9.37	5.82	1.35	.02	10.08	10.77	10.35	7.64	2.27
26	10.01	9.94	9.99	10.07	8.69	5.25	10.02	10.25	10.02	8.99	5.88	2.06	.15	10.25	10.58	9.44	6.54	3.02
27	10.00	9.94	10.00	10.10	9.33	7.28	10.10	10.20	9.84	8.99	7.34	4.82	1.23	10.34	10.30	8.84	6.85	5.40
28	9.98	9.96	10.02	10.07	10.12	10.24	10.15	10.13	9.75	9.31	9.53	9.42	5.79	10.36	10.00	8.70	8.11	8.85
29	9.98	9.97	10.02	10.03	10.73	13.08	10.17	10.05	9.74	9.78	11.62	14.70	16.08	10.31	9.76	8.97	9.70	12.74
30	9.98	9.99	10.02	9.98	10.96	14.53	10.16	9.99	9.79	10.23	12.94	18.34	26.73	10.23	9.61	9.49	11.13	15.91
31	9.98	10.00	10.01	9.96	10.79	13.98	10.14	9.94	9.89	10.52	13.10	18.35	26.73	10.13	9.59	10.06	12.06	16.93
32	9.98	10.01	10.00	9.96	10.38	11.95	10.10	9.91	9.99	10.59	12.15	14.73	16.08	10.02	9.67	10.50	12.29	15.07
33	9.98	10.01	10.00	9.98	9.93	9.53	10.06	9.91	10.07	10.47	10.54	9.55	5.79	9.93	9.82	10.73	11.77	11.12
34	9.99	10.01	10.00	10.00	9.60	7.61	10.02	9.92	10.12	10.22	8.92	5.26	1.24	9.86	9.98	10.71	10.70	7.04
35	9.99	10.01	10.00	10.01	9.46	6.72	9.98	9.95	10.12	9.96	7.86	3.21	.22	9.84	10.11	10.50	9.49	4.65
36	10.00	10.01	10.00	10.02	9.52	7.04	9.94	9.98	10.09	9.76	7.67	3.60	.51	9.84	10.19	10.18	8.57	4.54
37	10.00	10.00	10.00	10.01	9.75	8.36	9.92	10.01	10.04	9.67	8.33	6.01	2.36	9.88	10.20	9.86	8.26	6.24
38	10.00	10.00	10.00	10.01	10.02	10.19	9.92	10.03	10.00	9.70	9.49	9.73	7.47	9.93	10.17	9.63	8.58	8.94
39	10.00	10.00	10.00	10.00	10.23	11.82	9.93	10.04	9.96	9.82	10.70	13.56	16.07	9.99	10.10	9.54	9.33	11.83
40	10.00	10.00	10.00	9.99	10.32	12.63	9.96	10.04	9.95	9.97	11.53	16.02	23.53	10.03	9.61	10.18	14.02	

TABLE22 FROM 'STATISTICAL ANALYSES OF INDUSTRIAL PROPERTY RETIREMENTS' BY ROBLEY WINFREY, BULLETIN 125, IOWA STATE UNIVERSITY

	L0	L1	L2	L3	L4	L5	S0	S1	S2	S3	S4	S5	S6	R1	R2	R3	R4	R5
41	10.00	10.00	10.00	9.99	10.28	12.36	9.99	10.02	9.95	10.10	11.73	16.04	23.53	10.06	9.96	9.77	10.86	14.74
42	10.00	10.00	10.00	10.00	10.15	11.24	10.02	10.01	9.96	10.17	11.30	13.66	16.07	10.07	9.92	9.97	11.18	13.67
43	10.00	10.00	10.00	10.00	9.99	9.80	10.03	10.00	9.98	10.18	10.47	10.02	7.48	10.06	9.90	10.15	11.09	11.21
44	10.00	10.00	10.00	10.00	9.87	8.60	10.03	9.99	10.00	10.13	9.56	6.70	2.39	10.04	9.91	10.25	10.66	8.43
45	10.00	10.00	10.00	10.00	9.81	8.02	10.03	9.99	10.02	10.05	8.91	4.88	.70	10.02	9.94	10.26	10.06	6.47
46	10.00	10.00	10.00	10.00	9.83	8.19	10.02	10.00	10.02	9.97	8.71	5.02	1.05	10.00	9.98	10.20	9.51	6.01
47	10.00	10.00	10.00	10.00	9.90	9.00	10.01	10.00	10.02	9.92	8.99	6.89	3.38	9.99	10.01	10.09	9.18	7.01
48	10.00	10.00	10.00	10.00	10.00	10.10	10.01	10.00	10.02	9.90	9.59	9.76	8.49	9.98	10.04	9.97	9.16	8.95
49	10.00	10.00	10.00	10.00	10.07	11.07	10.00	10.00	10.01	9.91	10.26	12.63	15.66	9.97	10.05	9.88	9.42	11.09
50	10.00	10.00	10.00	10.00	10.11	11.55	9.99	10.00	10.00	9.95	10.77	14.42	21.26	9.97	10.04	9.84	9.84	12.73
51	10.00	10.00	10.00	10.00	10.10	11.42	9.99	10.00	9.99	10.00	10.95	14.47	21.26	9.98	10.01	9.85	10.26	13.32
52	10.00	10.00	10.00	10.06	10.77	9.99	10.00	9.99	10.04	10.78	12.81	15.66	9.98	9.99	9.90	10.54	12.69	
53	10.00	10.00	10.00	10.00	9.92	9.99	10.00	9.99	10.06	10.35	10.19	8.50	9.99	9.98	9.98	10.61	11.10	
54	10.00	10.00	10.00	9.96	9.18	10.00	10.00	9.99	10.05	9.85	7.67	3.46	10.00	9.97	10.04	10.47	9.18	
55	10.00	10.00	10.00	9.94	8.81	10.00	10.00	10.00	10.04	9.46	6.19	1.40	10.01	9.97	10.08	10.20	7.70	
56	10.00	10.00	10.00	9.94	8.90	10.00	10.00	10.00	10.01	9.30	6.20	1.72	10.01	9.98	10.10	9.90	7.18	
57	10.00	10.00	10.00	9.96	9.39	10.00	10.00	10.00	9.98	9.40	7.57	4.25	10.01	10.00	10.08	9.66	7.72	
58	10.00	10.00	10.00	10.00	10.05	10.00	10.00	10.00	9.97	9.70	9.75	9.09	10.01	10.01	10.04	9.53	9.03	
59	10.00	10.00	10.00	10.00	10.02	10.63	10.00	10.00	10.00	9.97	10.08	11.91	15.14	10.00	10.01	10.00	9.62	10.58
60	10.00	10.00	10.00	10.04	10.92	10.00	10.00	10.00	9.98	10.38	13.27	19.53	10.00	10.02	9.96	9.79	11.82	
61	10.00	10.00	10.00	10.04	10.85	10.00	10.00	10.00	9.99	10.52	13.34	19.53	10.00	10.01	9.94	10.02	12.34	
62	10.00	10.00	10.00	10.02	10.48	10.00	10.00	10.00	10.00	10.46	12.16	15.14	9.99	10.01	9.94	10.20	11.98	
63	10.00	10.00	10.00	10.00	9.97	10.00	10.00	10.00	10.01	10.24	10.24	9.12	9.99	10.00	9.96	10.30	10.94	
64	10.00	10.00	10.00	9.99	9.52	10.00	10.00	10.00	10.02	9.97	8.35	4.39	9.99	10.00	9.98	10.29	9.61	
65	10.00	10.00	10.00	10.00	9.98	9.29	10.00	10.00	10.00	10.02	9.74	7.18	2.18	9.99	9.99	10.01	10.18	8.51
66	10.00	10.00	10.00	9.98	9.34	10.00	10.00	10.00	10.01	9.62	7.12	2.44	10.00	9.99	10.03	10.03	8.03	
67	10.00	10.00	10.00	9.99	9.62	10.00	10.00	10.00	10.00	9.65	8.12	4.97	10.00	9.99	10.03	9.88	8.30	
68	10.00	10.00	10.00	10.00	10.02	10.00	10.00	10.00	9.99	9.80	9.74	9.44	10.00	10.00	10.03	9.79	9.16	
69	10.00	10.00	10.00	10.01	10.37	10.00	10.00	10.00	9.99	10.00	11.38	14.60	10.00	10.00	10.02	9.78	10.26	
70	10.00	10.00	10.00	10.01	10.55	10.00	10.00	10.00	9.99	10.18	12.42	18.17	10.00	10.00	10.00	9.84	11.19	
71	10.00	10.00	10.00	10.01	10.51	10.00	10.00	10.00	9.99	10.28	12.51	18.17	10.00	10.00	9.99	9.94	11.63	
72	10.00	10.00	10.00	10.01	10.29	10.00	10.00	10.00	10.00	10.26	11.66	14.62	10.00	10.00	9.98	10.05	11.46	
73	10.00	10.00	10.00	10.00	9.99	10.00	10.00	10.00	10.00	10.16	10.25	9.50	10.00	10.00	9.98	10.13	10.77	
74	10.00	10.00	10.00	10.00	9.72	10.00	10.00	10.00	10.00	10.01	8.82	5.18	10.00	10.00	9.98	10.16	9.85	
75	10.00	10.00	10.00	9.99	9.58	10.00	10.00	10.00	10.00	9.88	7.92	2.98	10.00	10.00	9.99	10.13	9.04	
76	10.00	10.00	10.00	9.99	9.60	10.00	10.00	10.00	10.00	9.80	7.83	3.18	10.00	10.00	10.00	10.06	8.63	
77	10.00	10.00	10.00	9.99	9.77	10.00	10.00	10.00	10.00	9.80	8.54	5.58	10.00	10.00	10.01	9.98	8.74	
78	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	9.87	9.75	9.64	10.00	10.00	10.01	9.91	9.30	
79	10.00	10.00	10.00	10.00	10.22	10.00	10.00	10.00	10.00	9.98	10.99	14.09	10.00	10.00	10.01	9.88	10.08	
80	10.00	10.00	10.00	10.00	10.33	10.00	10.00	10.00	10.00	10.08	11.79	17.06	10.00	10.00	10.01	9.89	10.76	

TABLE22 FROM 'STATISTICAL ANALYSES OF INDUSTRIAL PROPERTY RETIREMENTS' BY ROBLEY WINFREY, BULLETIN 125, IOWA STATE UNIVERSITY

	L0	L1	L2	L3	L4	L5	S0	S1	S2	S3	S4	S5	S6	R1	R2	R3	R4	R5
81	10.00	10.00	10.00	10.00	10.00	10.31	10.00	10.00	10.00	10.14	11.88	17.06	10.00	10.00	10.00	9.91	11.13	
82	10.00	10.00	10.00	10.00	10.00	10.18	10.00	10.00	10.00	10.15	11.28	14.12	10.00	10.00	10.00	9.97	11.07	
83	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.10	10.24	11.07	10.00	10.00	10.00	10.03	10.62	
84	10.00	10.00	10.00	10.00	10.00	9.84	10.00	10.00	10.00	10.02	9.16	4.51	10.00	10.00	10.00	10.08	9.98	
85	10.00	10.00	10.00	10.00	10.00	9.75	10.00	10.00	10.00	9.94	8.46	3.75	10.00	10.00	10.00	10.09	9.39	
86	10.00	10.00	10.00	10.00	10.00	9.76	10.00	10.00	10.00	9.90	8.37	3.88	10.00	10.00	10.00	10.07	9.06	
87	10.00	10.00	10.00	10.00	10.00	9.86	10.00	10.00	10.00	9.89	8.88	6.10	10.00	10.00	10.00	10.02	9.09	
88	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	9.92	9.77	9.75	10.00	10.00	10.00	9.98	9.44	
89	10.00	10.00	10.00	10.00	10.00	10.12	10.00	10.00	10.00	9.98	10.70	13.62	10.00	10.00	10.00	9.95	9.98	
90	10.00	10.00	10.00	10.00	10.00	10.19	10.00	10.00	10.00	10.04	11.32	16.13	10.00	10.00	10.00	9.94	10.48	
91	10.00	10.00	10.00	10.00	10.00	10.19	10.00	10.00	10.00	10.08	11.42	16.17	10.00	10.00	10.00	9.95	10.78	
92	10.00	10.00	10.00	10.00	10.00	10.11	10.00	10.00	10.00	10.08	10.98	13.94	10.00	10.00	10.00	9.98	10.78	
93	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.06	10.21	10.23	10.00	10.00	10.00	10.02	10.49	
94	10.00	10.00	10.00	10.00	10.00	9.90	10.00	10.00	10.00	10.02	9.41	6.06	10.00	10.00	10.00	10.04	10.05	
95	10.00	10.00	10.00	10.00	10.00	9.85	10.00	10.00	10.00	9.98	8.86	4.18	10.00	10.00	10.00	10.05	9.62	
96	10.00	10.00	10.00	10.00	10.00	9.85	10.00	10.00	10.00	9.95	8.77	4.52	10.00	10.00	10.00	10.04	9.36	
97	10.00	10.00	10.00	10.00	10.00	9.91	10.00	10.00	10.00	9.94	9.14	6.55	10.00	10.00	10.00	10.01	9.34	
98	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	9.95	9.80	9.81	10.00	10.00	10.00	9.98	9.56	
99	10.00	10.00	10.00	10.00	10.00	10.07	10.00	10.00	10.00	9.98	10.50	13.19	10.00	10.00	10.00	9.99	9.93	
100	10.00	10.00	10.00	10.00	10.00	10.12	10.00	10.00	10.00	10.01	10.97	15.36	10.00	10.00	10.00	10.01	10.30	
101	10.00	10.00	10.00	10.00	10.00	10.11	10.00	10.00	10.00	10.04	11.06	15.45	10.00	10.00	10.00	10.01	10.53	
102	10.00	10.00	10.00	10.00	10.00	10.07	10.00	10.00	10.00	10.05	10.76	13.46	10.00	10.00	10.00	10.02	10.56	
103	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.04	10.19	10.12	10.00	10.00	10.00	10.02	10.38	
104	10.00	10.00	10.00	10.00	10.00	9.94	10.00	10.00	10.00	10.02	9.57	6.74	10.00	10.00	10.00	10.02	10.08	
105	10.00	10.00	10.00	10.00	10.00	9.91	10.00	10.00	10.00	9.99	9.16	4.89	10.00	10.00	10.00	10.01	9.77	
106	10.00	10.00	10.00	10.00	10.00	9.91	10.00	10.00	10.00	9.97	9.08	5.07	10.00	10.00	10.00	10.00	9.56	
107	10.00	10.00	10.00	10.00	10.00	9.95	10.00	10.00	10.00	9.96	9.34	6.94	10.00	10.00	10.00	9.99	9.53	
108	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	9.97	9.83	9.85	10.00	10.00	10.00	9.98	9.66	
109	10.00	10.00	10.00	10.00	10.00	10.04	10.00	10.00	10.00	9.99	10.35	12.81	10.00	10.00	10.00	9.99	9.91	
110	10.00	10.00	10.00	10.00	10.07	10.00	10.00	10.00	10.00	10.72	14.70	10.00	10.00	10.00	10.00	10.18		
111	10.00	10.00	10.00	10.00	10.07	10.00	10.00	10.00	10.00	10.02	10.80	14.79	10.00	10.00	10.00	10.00	10.36	
112	10.00	10.00	10.00	10.00	10.04	10.00	10.00	10.00	10.00	10.03	10.58	13.04	10.00	10.00	10.00	10.01	10.40	
113	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.02	10.16	10.11	10.00	10.00	10.00	10.01	10.29	
114	10.00	10.00	10.00	10.00	10.00	9.97	10.00	10.00	10.00	10.01	9.70	7.21	10.00	10.00	10.00	10.01	10.09	
115	10.00	10.00	10.00	10.00	10.00	9.95	10.00	10.00	10.00	10.00	9.38	5.53	10.00	10.00	10.00	10.00	9.87	
116	10.00	10.00	10.00	10.00	10.00	9.95	10.00	10.00	10.00	10.00	9.99	9.31	5.61	10.00	10.00	10.00	9.99	9.71
117	10.00	10.00	10.00	10.00	10.00	9.97	10.00	10.00	10.00	10.00	9.98	9.49	7.27	10.00	10.00	10.00	9.99	9.66
118	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	9.98	9.85	9.86	10.00	10.00	10.00	9.99	9.74
119	10.00	10.00	10.00	10.00	10.02	10.00	10.00	10.00	10.00	10.00	9.99	10.25	12.47	10.00	10.00	10.00	10.00	9.91
120	10.00	10.00	10.00	10.00	10.04	10.00	10.00	10.00	10.00	10.00	10.53	14.13	10.00	10.00	10.00	10.00	10.10	

## C HANDY-WHITMAN INDICES:

C	TOTAL YEAR	PLANT EQPMT	STATN #353	TOWRS & FIX #354	POLES & FIX #355	OVRHD CNDCT #356
C	1940	22	35	17	15	22
C	1941	23	36	19	17	23
C	1942	25	37	20	18	25
C	1943	25	36	20	19	26
C	1944	25	35	21	21	26
C	1945	26	35	21	22	26
C	1946	29	39	24	24	30
C	1947	34	47	28	29	35
C	1948	37	49	31	32	39
C	1949	38	52	32	32	39
C	1950	40	56	34	33	41
C	1951	45	63	37	36	47
C	1952	46	64	39	37	49
C	1953	49	68	41	39	51
C	1954	50	69	42	40	52
C	1955	52	70	43	42	55
C	1956	56	77	46	44	61
C	1957	57	81	48	47	63
C	1958	59	84	51	49	63
C	1959	60	83	53	50	62
C	1960	60	77	55	52	63
C	1961	59	70	57	53	63
C	1962	59	69	57	54	65
C	1963	59	65	59	55	61
C	1964	61	69	61	56	64
C	1965	64	73	63	58	67
C	1966	67	75	67	61	70
C	1967	70	79	71	63	73
C	1968	73	83	74	65	73
C	1969	78	85	78	69	80
C	1970	83	89	82	76	89
C	1971	89	91	87	81	98
C	1972	93	94	92	87	99
C	1973	100	100	100	100	100
C	1974	124	124	123	126	117
C	1975	145	148	147	145	146
C	1976	158	156	150	150	173
C	1977	172	172	154	160	191
C	1978	174	182	170	170	176
C	1979	190	196	186	190	194
C	1980	211	217	210	210	215
C	1981	230	235	227	233	237
C	1982	245	254	229	253	251
C	1983	254	257	233	257	277
C	1984	255	261	247	263	265
C	1985	252	260	254	255	250
C	1986	256	262	262	258	254
C	1987	257	270	267	260	234
C	1988	286	280	280	282	326
C	1989	296	295	288	301	320
C	1990	308	315	290	309	333
C	1991	314	315	281	334	356
C	1992	310	323	283	353	312
C	1993	321	335	297	359	325
C	1994	336	353	314	376	333
C	1995	353	365	321	391	368

COST-EVALUATION PERIOD DATA:

YEAR	PLANT INVESTMENT	ESCALATION FACTOR
1996	241800.	1.00900
1997	180300.	1.03100
1998	176600.	1.05300
1999	168900.	1.07700
2000	172900.	1.10200
2001	195200.	1.12900
2002	264200.	1.15700

## PLANT INVESTMENT BY YEAR AND FERC ACCOUNT

YEAR	350.3	352	353.1	354	355	356	358	359
1940	691.	466.	257.	1166.	89.	1469.	0.	100.
1941	1675.	924.	2189.	3835.	785.	6978.	0.	144.
1942	458.	711.	1313.	68.	601.	1675.	0.	289.
1943	568.	616.	1834.	4202.	120.	3620.	0.	431.
1944	32.	23.	13.	1.	26.	328.	0.	132.
1945	7.	32.	471.	538.	203.	511.	0.	101.
1946	62.	164.	548.	613.	104.	446.	0.	20.
1947	220.	69.	523.	12.	371.	604.	0.	116.
1948	807.	346.	1719.	325.	1069.	2404.	0.	177.
1949	506.	111.	3962.	403.	1206.	1652.	0.	114.
1950	1654.	768.	1672.	9205.	955.	9326.	0.	1173.
1951	1107.	475.	3286.	2030.	909.	3474.	0.	12.
1952	998.	443.	3933.	7448.	627.	7376.	193.	9.
1953	1510.	1604.	10639.	8496.	3495.	11045.	0.	236.
1954	2246.	1048.	5303.	13099.	1438.	12402.	0.	1484.
1955	522.	982.	10439.	2127.	463.	2633.	0.	50.
1956	1150.	540.	6954.	15390.	244.	12931.	0.	358.
1957	816.	1182.	9119.	1549.	1506.	3497.	0.	299.
1958	1846.	694.	7808.	5518.	1865.	7007.	0.	740.
1959	858.	371.	8115.	36.	1229.	1983.	0.	236.
1960	372.	177.	3400.	710.	395.	1106.	0.	40.
1961	584.	428.	7169.	2144.	741.	4162.	0.	212.
1962	2191.	559.	4035.	11363.	1407.	9796.	0.	543.
1963	1076.	274.	4229.	1232.	470.	1844.	0.	391.
1964	534.	593.	2897.	2217.	262.	1517.	0.	50.
1965	2244.	205.	4969.	9048.	324.	11700.	0.	538.
1966	2288.	634.	11059.	4123.	1144.	6264.	0.	274.
1967	2973.	1368.	12779.	11313.	828.	12338.	1401.	235.
1968	3570.	2925.	22670.	34803.	329.	36903.	0.	1036.
1969	5693.	2342.	15466.	26291.	1203.	26748.	0.	513.
1970	4710.	13541.	76507.	26627.	1173.	28554.	0.	943.
1971	4561.	1400.	14203.	16012.	649.	14211.	0.	329.
1972	4005.	2522.	20037.	14982.	1262.	18877.	0.	879.
1973	5352.	2184.	21089.	28675.	576.	26372.	1494.	1615.
1974	2265.	1152.	18740.	6504.	1598.	7255.	0.	1121.
1975	3484.	3720.	28935.	20981.	1957.	15024.	0.	1320.
1976	6744.	2263.	29886.	33087.	2074.	29099.	1318.	860.
1977	2548.	2718.	36766.	62818.	1558.	69438.	65.	1036.
1978	1324.	1798.	41730.	7713.	1558.	7802.	43.	51.
1979	1830.	1242.	24069.	9162.	2155.	12050.	0.	1337.
1980	388.	1709.	25538.	14702.	856.	16048.	0.	201.
1981	9241.	2654.	50949.	61377.	1320.	64696.	0.	527.
1982	627.	1982.	41018.	3573.	712.	5095.	0.	356.
1983	1944.	5987.	43349.	28742.	3252.	29255.	4818.	823.
1984	10353.	7522.	70637.	76150.	3318.	80683.	0.	8436.
1985	992.	8854.	78163.	303.	1728.	3230.	0.	-299.
1986	2897.	5915.	26492.	7490.	12869.	20574.	0.	1326.
1987	11797.	7774.	36947.	100751.	10586.	139642.	0.	40185.
1988	6237.	9055.	26772.	4838.	2727.	6911.	0.	309.
1989	3830.	13836.	155594.	2056.	1493.	1450.	0.	166.
1990	15.	4291.	56938.	3372.	1398.	2608.	0.	0.
1991	910.	6365.	102139.	1305.	1573.	3231.	0.	0.
1992	267.	3238.	163887.	221.	2116.	6607.	0.	325.
1993	1344.	9285.	96112.	21577.	1295.	22527.	0.	664.
1994	3122.	22902.	199733.	19643.	199.	19695.	0.	118.
1995	869.	9682.	58936.	524.	1143.	4282.	0.	450.
1996	7351.	9841.	96188.	42218.	4812.	48191.	532.	4111.
1997	5481.	7338.	71723.	31480.	3588.	35934.	397.	3065.
1998	5369.	7188.	70251.	30834.	3514.	35196.	389.	3002.
1999	5135.	6874.	67188.	29490.	3361.	33662.	372.	2871.
2000	5256.	7037.	68780.	30188.	3441.	34459.	380.	2939.
2001	5934.	7945.	77651.	34082.	3884.	38903.	429.	3318.
2002	8032.	10753.	105099.	46129.	5258.	52655.	581.	4491.

## PLANT INVESTMENT BY YEAR AND FERC ACCOUNT

YEAR	389	390	391.1	391.2	392.1	392.2	392.3	393
1940	107.	66.	0.	0.	0.	0.	0.	0.
1941	2.	304.	0.	0.	0.	0.	0.	0.
1942	6.	107.	0.	0.	0.	0.	0.	0.
1943	2.	270.	0.	0.	0.	0.	0.	0.
1944	0.	18.	0.	0.	0.	0.	0.	0.
1945	0.	3.	0.	0.	9.	0.	0.	0.
1946	0.	26.	0.	0.	0.	0.	0.	0.
1947	0.	75.	0.	0.	0.	0.	0.	0.
1948	37.	34.	0.	0.	3.	0.	0.	0.
1949	4.	6.	0.	0.	0.	0.	0.	0.
1950	1.	315.	0.	0.	0.	0.	0.	0.
1951	9.	122.	0.	0.	10.	0.	0.	0.
1952	0.	292.	0.	0.	0.	0.	0.	0.
1953	0.	458.	0.	0.	0.	0.	0.	0.
1954	43.	227.	0.	0.	0.	0.	0.	0.
1955	51.	330.	0.	0.	0.	0.	0.	0.
1956	12.	170.	0.	0.	0.	0.	0.	0.
1957	1.	222.	0.	0.	0.	0.	0.	0.
1958	3.	105.	0.	0.	0.	0.	0.	0.
1959	4.	179.	0.	0.	0.	0.	0.	0.
1960	0.	401.	0.	0.	0.	0.	0.	0.
1961	17.	472.	0.	0.	0.	0.	0.	0.
1962	0.	116.	0.	0.	0.	0.	0.	0.
1963	3.	1500.	0.	0.	20.	0.	0.	0.
1964	0.	265.	0.	0.	15.	0.	0.	0.
1965	3.	736.	0.	0.	5.	0.	0.	0.
1966	12.	74.	0.	0.	0.	0.	0.	16.
1967	7.	234.	14.	0.	16.	0.	0.	7.
1968	37.	202.	0.	0.	26.	0.	0.	35.
1969	5.	983.	0.	0.	121.	0.	0.	29.
1970	23.	115.	0.	0.	120.	0.	0.	0.
1971	244.	253.	0.	4.	163.	0.	0.	26.
1972	8.	2292.	5.	0.	29.	0.	0.	20.
1973	1.	1535.	0.	0.	763.	0.	0.	0.
1974	1.	1796.	0.	0.	420.	0.	0.	180.
1975	24.	1410.	0.	0.	400.	0.	0.	90.
1976	30.	688.	10.	11.	504.	0.	0.	113.
1977	76.	7649.	7.	376.	306.	0.	0.	211.
1978	29.	1473.	0.	10.	1111.	0.	0.	89.
1979	306.	5933.	16.	80.	460.	538.	0.	497.
1980	0.	877.	51.	123.	657.	0.	0.	258.
1981	93.	1026.	61.	123.	668.	0.	0.	41.
1982	16.	1346.	21.	115.	555.	0.	0.	60.
1983	64.	7346.	106.	791.	178.	0.	1562.	0.
1984	2.	2948.	92.	1060.	77.	0.	0.	0.
1985	6.	1974.	140.	765.	754.	0.	0.	0.
1986	5.	1465.	196.	1846.	425.	0.	2102.	0.
1987	31.	1926.	1255.	2449.	236.	0.	0.	0.
1988	18.	986.	249.	1829.	478.	0.	0.	-74.
1989	17.	2364.	211.	1400.	1164.	0.	0.	0.
1990	147.	3652.	93.	1375.	560.	0.	0.	6.
1991	0.	5959.	526.	4988.	1311.	0.	0.	293.
1992	333.	8033.	439.	6240.	2056.	1895.	0.	350.
1993	176.	8882.	45.	6048.	970.	1679.	0.	214.
1994	912.	26759.	0.	1287.	117.	0.	0.	0.
1995	87.	1811.	0.	0.	0.	0.	0.	0.
1996	169.	6093.	193.	1814.	822.	242.	218.	145.
1997	126.	4544.	144.	1352.	613.	180.	162.	108.
1998	124.	4450.	141.	1325.	600.	177.	159.	106.
1999	118.	4256.	135.	1267.	574.	169.	152.	101.
2000	121.	4357.	138.	1297.	588.	173.	156.	104.
2001	137.	4919.	156.	1464.	664.	195.	176.	117.
2002	185.	6658.	211.	1982.	898.	264.	238.	159.

## PLANT INVESTMENT BY YEAR AND FERC ACCOUNT

YEAR	394	395	395.1	396	397.3	398	TOTAL
1940	0.	0.	0.	0.	13.	0.	4424.
1941	0.	0.	0.	0.	27.	0.	16863.
1942	0.	0.	0.	0.	14.	0.	5242.
1943	0.	0.	0.	0.	16.	0.	11679.
1944	0.	3.	0.	0.	2.	0.	578.
1945	0.	0.	0.	0.	-2.	0.	1873.
1946	0.	0.	0.	0.	30.	0.	2013.
1947	0.	0.	0.	0.	6.	0.	1996.
1948	0.	0.	0.	0.	-3.	0.	6918.
1949	0.	0.	0.	0.	17.	0.	7981.
1950	24.	1.	0.	0.	26.	0.	25120.
1951	0.	0.	0.	0.	214.	0.	11648.
1952	8.	7.	0.	0.	-902.	0.	20432.
1953	0.	52.	0.	0.	39.	0.	37574.
1954	24.	0.	0.	0.	355.	0.	37669.
1955	13.	72.	0.	0.	1419.	0.	19101.
1956	0.	-84.	0.	0.	420.	0.	38085.
1957	0.	0.	0.	0.	43.	0.	18234.
1958	0.	0.	0.	0.	-146.	0.	25440.
1959	0.	0.	0.	26.	252.	0.	13289.
1960	6.	0.	0.	0.	117.	0.	6724.
1961	0.	105.	0.	0.	255.	0.	16289.
1962	8.	0.	0.	0.	90.	0.	30108.
1963	0.	40.	0.	0.	231.	0.	11310.
1964	22.	1709.	0.	0.	225.	0.	10306.
1965	45.	367.	0.	0.	621.	0.	30805.
1966	10.	164.	0.	77.	373.	4.	26516.
1967	75.	16.	0.	0.	133.	0.	43737.
1968	34.	107.	0.	0.	831.	0.	103508.
1969	0.	248.	0.	95.	763.	0.	80500.
1970	4.	227.	0.	57.	1745.	0.	154346.
1971	15.	326.	0.	5.	1225.	0.	53626.
1972	9.	161.	0.	256.	928.	0.	66272.
1973	51.	1221.	0.	0.	1140.	0.	92068.
1974	51.	207.	0.	169.	1086.	0.	42545.
1975	15.	1082.	0.	686.	1327.	0.	80455.
1976	186.	881.	0.	852.	8997.	0.	117603.
1977	111.	1384.	1294.	799.	4106.	0.	193266.
1978	169.	872.	1363.	583.	3431.	0.	71149.
1979	171.	861.	678.	233.	3498.	0.	65116.
1980	182.	352.	281.	343.	3561.	0.	66127.
1981	106.	627.	171.	798.	9803.	0.	204281.
1982	284.	935.	0.	773.	3215.	0.	60683.
1983	105.	882.	0.	1352.	6320.	0.	136876.
1984	608.	1808.	0.	1091.	7547.	0.	272332.
1985	179.	1194.	0.	727.	5978.	0.	104688.
1986	93.	1826.	184.	1021.	7788.	0.	94514.
1987	161.	2754.	0.	368.	8860.	0.	365722.
1988	83.	1510.	0.	549.	9869.	0.	72346.
1989	269.	1480.	0.	367.	6854.	0.	192551.
1990	452.	1367.	0.	753.	22648.	0.	99675.
1991	210.	2845.	0.	1383.	18079.	0.	151117.
1992	752.	1808.	0.	3113.	20282.	0.	222508.
1993	638.	2671.	0.	3111.	31273.	0.	208511.
1994	96.	872.	11.	299.	32443.	0.	328208.
1995	0.	349.	0.	0.	13587.	0.	91720.
1996	290.	1862.	218.	1112.	13589.	0.	240011.
1997	216.	1388.	162.	829.	10133.	0.	178966.
1998	212.	1360.	159.	812.	9925.	0.	175293.
1999	203.	1301.	152.	777.	9492.	0.	167650.
2000	207.	1331.	156.	795.	9717.	0.	171621.
2001	234.	1503.	176.	898.	10970.	0.	193756.
2002	317.	2034.	238.	1215.	14848.	0.	262245.

## ADJUSTED PLANT INVESTMENT BY YEAR AND FERC ACCOUNT

YEAR	350.3	352	353.1	354	355	356	358	359
1996	7351.	8717.	44707.	39239.	-3896.	44689.	-587.	4111.
1997	5481.	6165.	17976.	28342.	-5188.	32244.	-707.	3065.
1998	5369.	5965.	14317.	27531.	-5307.	31313.	-682.	3002.
1999	5135.	5604.	9165.	26014.	-5437.	29577.	-753.	2871.
2000	5256.	5721.	8741.	26534.	-5293.	30166.	-732.	2939.
2001	5934.	6581.	15667.	30245.	-4773.	34398.	-629.	3318.
2002	8032.	9341.	41217.	42103.	-3331.	47931.	-459.	4491.

YEAR	389	390	391.1	391.2	392.1	392.2	392.3	393
1996	169.	4784.	-74.	466.	-1024.	105.	-51.	-72.
1997	126.	3168.	-161.	-213.	-1288.	102.	-164.	-109.
1998	124.	3011.	-201.	-471.	-1329.	150.	-227.	-113.
1999	118.	2755.	-241.	-767.	-1355.	159.	-289.	-120.
2000	121.	2794.	-264.	-974.	-1313.	162.	-328.	-122.
2001	137.	3293.	-264.	-1036.	-1188.	167.	-323.	-114.
2002	185.	4969.	-214.	-730.	-890.	202.	-255.	-79.

YEAR	394	395	395.1	396	397.3	398	TOTAL
1996	-98.	-269.	-149.	-353.	4359.	-2.	152120.
1997	-182.	-834.	-207.	-696.	128.	-2.	87046.
1998	-193.	-956.	-209.	-766.	-875.	-2.	79451.
1999	-206.	-1105.	-212.	-851.	-2103.	-2.	67957.
2000	-203.	-1161.	-204.	-879.	-2658.	-2.	68301.
2001	-177.	-1070.	-178.	-818.	-2156.	-2.	87012.
2002	-94.	-614.	-110.	-537.	1009.	-1.	152168.

## 2002 REPLACEMENTS BY INDIVIDUAL FERC ACCOUNTS:

CURVE LIFE FERC ACCT	R2 100 350.3	S0 90 352	R3 100 354	R3 39 355	R3 100 356	R5 25 358	90 359
1996	0.	1124.	51481.	2979.	8708.	3502.	1119.
1997	0.	1173.	53747.	3138.	8776.	3690.	1104.
1998	0.	1222.	55935.	3303.	8821.	3883.	1070.
1999	0.	1270.	58023.	3476.	8798.	4085.	1124.
2000	0.	1316.	60039.	3655.	8734.	4293.	1112.
2001	0.	1363.	61984.	3837.	8658.	4505.	1058.
2002	0.	1412.	63881.	4026.	8589.	4724.	1040.
2003	0.	1462.	65773.	4223.	8493.	4954.	980.
2004	0.	1513.	67592.	4426.	8371.	5191.	896.
2005	0.	1562.	69336.	4632.	8247.	5433.	898.
2006	0.	1611.	71015.	4846.	8155.	5683.	921.
2007	0.	1659.	72641.	5068.	8089.	5945.	940.
2008	0.	1706.	74207.	5294.	8012.	6213.	968.
2009	0.	1755.	75722.	5531.	7939.	6491.	1026.
2010	0.	1805.	77175.	5774.	7892.	6775.	971.
2011	0.	1856.	78575.	6020.	7869.	7064.	894.
2012	0.	1909.	79920.	6274.	7853.	7360.	831.
2013	0.	1963.	81210.	6537.	7853.	7667.	755.
2014	0.	2018.	82447.	6805.	7880.	7984.	679.
2015	0.	2073.	83634.	7078.	7935.	8306.	690.
2016	0.	2129.	84777.	7362.	8004.	8639.	719.
2017	0.	2186.	85861.	7656.	8080.	8988.	729.
2018	0.	2244.	86904.	7958.	8170.	9347.	780.
2019	0.	2304.	87901.	8274.	8282.	9719.	778.
2020	0.	2364.	88857.	8599.	8405.	10101.	761.
2021	0.	2427.	89737.	8929.	8522.	10488.	741.
2022	0.	2490.	90566.	9269.	8632.	10884.	690.
2023	0.	2554.	91336.	9618.	8750.	11293.	641.
2024	0.	2619.	92046.	9975.	8867.	11714.	624.
2025	0.	2684.	92694.	10337.	8962.	12142.	610.
2026	0.	2751.	93315.	10711.	9038.	12582.	614.
2027	0.	2818.	93891.	11094.	9109.	13034.	667.
2028	0.	2886.	94410.	11487.	9155.	13497.	704.
2029	0.	2955.	94888.	11893.	9169.	13974.	758.
2030	0.	3026.	95350.	12310.	9157.	14462.	814.
2031	0.	3097.	95783.	12733.	9132.	14957.	850.
2032	0.	3169.	96159.	13169.	9074.	15463.	879.
2033	0.	3242.	96499.	13616.	8986.	15985.	893.
2034	0.	3315.	96805.	14076.	8874.	16524.	902.
2035	0.	3389.	97058.	14544.	8750.	17072.	885.
2036	0.	3463.	97222.	15021.	8610.	17631.	868.
2037	0.	3537.	97321.	15501.	8462.	18190.	848.
2038	0.	3612.	97366.	15992.	8305.	18759.	818.
2039	0.	3688.	97308.	16487.	8153.	19334.	785.
2040	0.	3764.	97156.	16990.	8026.	19918.	767.
2041	0.	3840.	96956.	17500.	7917.	20508.	752.
2042	0.	3916.	96712.	18019.	7815.	21109.	729.
2043	0.	3994.	96470.	18554.	7725.	21731.	738.
2044	0.	4071.	96218.	19103.	7662.	22367.	723.
2045	0.	4148.	95977.	19662.	7621.	23014.	719.
2046	0.	4224.	95753.	20219.	7592.	23660.	719.
2047	0.	4299.	95656.	20771.	7577.	24292.	704.

## 2002 REPLACEMENTS BY INDIVIDUAL FERC ACCOUNTS:

CURVE LIFE FERC ACCT	90 389	L1 390	R2 391.1	R2 391.2	L1 392.1	R5 392.2	R3 392.3	L2 393
1996	0.	1309.	268.	1347.	1846.	137.	269.	217.
1997	0.	1376.	306.	1566.	1901.	78.	327.	218.
1998	0.	1439.	342.	1796.	1930.	27.	386.	219.
1999	0.	1501.	376.	2034.	1929.	10.	441.	222.
2000	0.	1564.	403.	2271.	1901.	11.	484.	226.
2001	0.	1626.	420.	2500.	1852.	28.	498.	231.
2002	0.	1689.	425.	2711.	1788.	62.	493.	237.
2003	0.	1753.	415.	2894.	1719.	123.	456.	242.
2004	0.	1817.	397.	3047.	1656.	230.	403.	245.
2005	0.	1882.	372.	3154.	1600.	388.	341.	245.
2006	0.	1946.	344.	3210.	1553.	595.	272.	244.
2007	0.	2008.	314.	3207.	1517.	782.	226.	241.
2008	0.	2069.	282.	3137.	1489.	877.	192.	236.
2009	0.	2128.	258.	3001.	1468.	801.	177.	230.
2010	0.	2186.	243.	2821.	1450.	602.	172.	225.
2011	0.	2245.	234.	2634.	1434.	390.	173.	220.
2012	0.	2304.	229.	2469.	1419.	254.	185.	216.
2013	0.	2361.	230.	2343.	1406.	203.	195.	213.
2014	0.	2416.	238.	2263.	1396.	188.	205.	211.
2015	0.	2469.	249.	2233.	1387.	192.	215.	210.
2016	0.	2521.	261.	2263.	1381.	207.	224.	211.
2017	0.	2571.	273.	2346.	1377.	233.	236.	211.
2018	0.	2620.	283.	2457.	1374.	275.	247.	212.
2019	0.	2668.	288.	2564.	1374.	338.	255.	213.
2020	0.	2714.	289.	2651.	1375.	425.	261.	214.
2021	0.	2758.	287.	2712.	1377.	526.	261.	214.
2022	0.	2800.	281.	2744.	1379.	613.	256.	215.
2023	0.	2841.	275.	2749.	1382.	661.	246.	215.
2024	0.	2878.	268.	2731.	1385.	649.	235.	214.
2025	0.	2914.	262.	2694.	1388.	577.	225.	214.
2026	0.	2948.	259.	2647.	1391.	471.	215.	214.
2027	0.	2981.	258.	2598.	1393.	364.	210.	214.
2028	0.	3012.	259.	2556.	1394.	286.	208.	214.
2029	0.	3042.	261.	2525.	1395.	240.	209.	213.
2030	0.	3069.	264.	2507.	1395.	226.	213.	213.
2031	0.	3092.	267.	2503.	1395.	238.	218.	213.
2032	0.	3115.	270.	2511.	1394.	266.	224.	213.
2033	0.	3136.	272.	2527.	1393.	309.	230.	213.
2034	0.	3157.	273.	2549.	1393.	363.	234.	214.
2035	0.	3177.	273.	2574.	1392.	425.	238.	214.
2036	0.	3196.	272.	2595.	1391.	488.	240.	214.
2037	0.	3213.	271.	2611.	1391.	537.	240.	214.
2038	0.	3230.	269.	2621.	1390.	566.	239.	214.
2039	0.	3245.	268.	2624.	1390.	564.	237.	214.
2040	0.	3261.	267.	2620.	1390.	529.	234.	214.
2041	0.	3276.	266.	2611.	1390.	472.	230.	214.
2042	0.	3290.	266.	2600.	1391.	404.	227.	214.
2043	0.	3304.	266.	2589.	1391.	343.	224.	214.
2044	0.	3318.	266.	2578.	1391.	297.	222.	214.
2045	0.	3331.	267.	2570.	1391.	274.	222.	214.
2046	0.	3344.	268.	2565.	1391.	275.	222.	214.
2047	0.	3357.	268.	2563.	1391.	294.	223.	214.

2003 REPLACEMENTS BY INDIVIDUAL FERC ACCOUNTS:

CURVE LIFE FERC ACCT	R2 100 350.3	S0 90 352	R3 100 353.1	R3 39 354	R3 100 355	R3 25 356	R5 90 358
1996	0.	1124.	51481.	2979.	8708.	3502.	1119.
1997	0.	1173.	53747.	3138.	8776.	3690.	1104.
1998	0.	1222.	55935.	3303.	8821.	3883.	1070.
1999	0.	1270.	58023.	3476.	8798.	4085.	1124.
2000	0.	1316.	60039.	3655.	8734.	4293.	1112.
2001	0.	1363.	61984.	3837.	8658.	4505.	1058.
2002	0.	1412.	63881.	4026.	8589.	4724.	1040.
2003	0.	1462.	65773.	4223.	8493.	4954.	980.
2004	0.	1515.	67614.	4427.	8370.	5192.	896.
2005	0.	1566.	69380.	4634.	8245.	5435.	898.
2006	0.	1617.	71073.	4849.	8153.	5686.	921.
2007	0.	1666.	72713.	5071.	8086.	5949.	940.
2008	0.	1715.	74293.	5299.	8008.	6218.	968.
2009	0.	1764.	75822.	5536.	7934.	6497.	1026.
2010	0.	1814.	77285.	5780.	7885.	6782.	971.
2011	0.	1866.	78697.	6027.	7861.	7072.	894.
2012	0.	1919.	80053.	6282.	7844.	7368.	831.
2013	0.	1973.	81353.	6545.	7842.	7677.	755.
2014	0.	2028.	82599.	6815.	7867.	7994.	679.
2015	0.	2084.	83796.	7088.	7919.	8317.	689.
2016	0.	2140.	84948.	7372.	7987.	8651.	718.
2017	0.	2198.	86040.	7667.	8060.	9001.	727.
2018	0.	2256.	87092.	7971.	8147.	9361.	777.
2019	0.	2316.	88097.	8288.	8256.	9735.	774.
2020	0.	2377.	89061.	8614.	8377.	10118.	755.
2021	0.	2440.	89949.	8945.	8490.	10506.	731.
2022	0.	2504.	90786.	9287.	8596.	10904.	676.
2023	0.	2568.	91564.	9637.	8711.	11315.	620.
2024	0.	2633.	92280.	9996.	8824.	11738.	596.
2025	0.	2699.	92936.	10360.	8915.	12167.	574.
2026	0.	2767.	93564.	10735.	8987.	12609.	568.
2027	0.	2835.	94147.	11119.	9053.	13062.	612.
2028	0.	2903.	94673.	11514.	9094.	13528.	644.
2029	0.	2973.	95157.	11922.	9102.	14007.	694.
2030	0.	3044.	95626.	12341.	9084.	14497.	757.
2031	0.	3116.	96065.	12766.	9053.	14994.	802.
2032	0.	3188.	96447.	13204.	8989.	15503.	842.
2033	0.	3261.	96793.	13654.	8892.	16028.	867.
2034	0.	3335.	97105.	14116.	8771.	16569.	889.
2035	0.	3410.	97363.	14586.	8638.	17120.	878.
2036	0.	3485.	97533.	15065.	8490.	17681.	864.
2037	0.	3560.	97638.	15547.	8333.	18243.	847.
2038	0.	3635.	97689.	16040.	8166.	18814.	816.
2039	0.	3711.	97636.	16538.	8005.	19393.	783.
2040	0.	3788.	97488.	17045.	7868.	19980.	765.

2041	0.	3865.	97294.	17557.	7752.	20574.	749.	0.
2042	0.	3942.	97054.	18079.	7643.	21178.	724.	0.
2043	0.	4020.	96817.	18618.	7546.	21803.	731.	0.
2044	0.	4098.	96569.	19170.	7476.	22443.	715.	0.
2045	0.	4176.	96332.	19732.	7434.	23093.	707.	0.
2046	0.	4253.	96113.	20291.	7404.	23743.	704.	0.
2047	0.	4328.	96019.	20847.	7389.	24378.	685.	0.
2048	0.	4404.	95913.	21404.	7400.	25013.	671.	0.

## 2003 REPLACEMENTS BY INDIVIDUAL FERC ACCOUNTS:

CURVE LIFE FERC ACCT	90 389	L1 65 390	R2 12 391.1	R2 13 391.2	L1 12 392.1	R5 15 392.2	R3 15 392.3	L2 18 393
1996	0.	1309.	268.	1347.	1846.	137.	269.	217.
1997	0.	1376.	306.	1566.	1901.	78.	327.	218.
1998	0.	1439.	342.	1796.	1930.	27.	386.	219.
1999	0.	1501.	376.	2034.	1929.	10.	441.	222.
2000	0.	1564.	403.	2271.	1901.	11.	484.	226.
2001	0.	1626.	420.	2500.	1852.	28.	498.	231.
2002	0.	1689.	425.	2711.	1788.	62.	493.	237.
2003	0.	1753.	415.	2894.	1719.	123.	456.	242.
2004	0.	1819.	394.	3033.	1644.	230.	402.	245.
2005	0.	1885.	368.	3137.	1579.	388.	341.	245.
2006	0.	1950.	339.	3188.	1521.	595.	271.	243.
2007	0.	2013.	308.	3180.	1473.	782.	224.	240.
2008	0.	2075.	275.	3104.	1433.	877.	189.	235.
2009	0.	2135.	249.	2960.	1403.	801.	173.	229.
2010	0.	2194.	232.	2771.	1379.	602.	166.	222.
2011	0.	2254.	221.	2573.	1360.	390.	166.	216.
2012	0.	2314.	213.	2397.	1342.	255.	177.	211.
2013	0.	2372.	211.	2259.	1327.	204.	185.	208.
2014	0.	2428.	216.	2164.	1314.	191.	192.	205.
2015	0.	2482.	224.	2120.	1304.	197.	199.	204.
2016	0.	2535.	234.	2137.	1296.	215.	204.	204.
2017	0.	2586.	244.	2210.	1290.	244.	212.	204.
2018	0.	2636.	254.	2314.	1287.	289.	219.	205.
2019	0.	2686.	261.	2420.	1285.	352.	225.	206.
2020	0.	2733.	265.	2513.	1286.	435.	231.	206.
2021	0.	2778.	265.	2584.	1287.	532.	233.	207.
2022	0.	2822.	262.	2628.	1290.	615.	232.	208.
2023	0.	2864.	256.	2644.	1293.	662.	227.	208.
2024	0.	2903.	250.	2634.	1297.	649.	218.	208.
2025	0.	2940.	244.	2604.	1300.	577.	211.	208.
2026	0.	2975.	240.	2559.	1303.	472.	203.	207.
2027	0.	3009.	238.	2510.	1305.	365.	198.	207.
2028	0.	3042.	238.	2461.	1307.	288.	196.	207.
2029	0.	3072.	239.	2424.	1308.	244.	195.	207.
2030	0.	3101.	241.	2401.	1308.	231.	198.	206.
2031	0.	3125.	244.	2392.	1308.	245.	201.	206.
2032	0.	3149.	247.	2396.	1308.	275.	205.	206.
2033	0.	3171.	249.	2411.	1307.	319.	209.	206.
2034	0.	3193.	250.	2433.	1306.	373.	213.	207.
2035	0.	3213.	251.	2457.	1305.	434.	216.	207.
2036	0.	3233.	251.	2480.	1304.	495.	218.	207.
2037	0.	3251.	250.	2499.	1304.	542.	218.	207.
2038	0.	3269.	249.	2511.	1303.	569.	218.	207.
2039	0.	3285.	247.	2516.	1303.	566.	217.	207.
2040	0.	3301.	246.	2514.	1303.	530.	215.	207.

2041	0.	3316.	245.	2507.	1303.	473.	212.	207.
2042	0.	3331.	245.	2497.	1303.	406.	210.	207.
2043	0.	3346.	244.	2485.	1304.	346.	208.	207.
2044	0.	3360.	245.	2473.	1304.	302.	206.	207.
2045	0.	3373.	245.	2464.	1304.	280.	205.	207.
2046	0.	3386.	246.	2458.	1304.	282.	205.	207.
2047	0.	3399.	246.	2455.	1304.	302.	206.	207.
2048	0.	3412.	247.	2455.	1304.	336.	207.	207.

## 2003 REPLACEMENTS BY INDIVIDUAL FERC ACCOUNTS:

CURVE LIFE FERC ACCT	L0 18 394	L2 22 395	L2 22 395.1	R2 15 396	S1 20 397.3	L0 10 398	TOTAL
1996	389.	2131.	367.	1465.	9230.	2.	87891.
1997	399.	2222.	369.	1526.	10004.	2.	91920.
1998	405.	2316.	368.	1578.	10800.	2.	95842.
1999	409.	2406.	364.	1628.	11595.	2.	99693.
2000	411.	2492.	359.	1674.	12375.	2.	103320.
2001	411.	2574.	354.	1716.	13127.	2.	106744.
2002	411.	2648.	348.	1752.	13839.	1.	110077.
2003	411.	2713.	343.	1786.	14509.	1.	113251.
2004	409.	2765.	338.	1815.	15124.	1.	116234.
2005	410.	2804.	334.	1847.	15682.	1.	119180.
2006	411.	2826.	330.	1874.	16184.	1.	122034.
2007	412.	2833.	326.	1892.	16624.	1.	124732.
2008	413.	2825.	322.	1899.	17007.	1.	127155.
2009	414.	2803.	318.	1890.	17331.	1.	129285.
2010	415.	2773.	313.	1862.	17599.	1.	131049.
2011	415.	2736.	308.	1816.	17814.	1.	132687.
2012	416.	2696.	304.	1752.	17971.	1.	134345.
2013	416.	2658.	299.	1675.	18081.	1.	136039.
2014	416.	2623.	295.	1595.	18144.	1.	137764.
2015	416.	2594.	291.	1523.	18165.	1.	139613.
2016	416.	2572.	288.	1466.	18153.	1.	141537.
2017	416.	2558.	286.	1428.	18114.	1.	143486.
2018	415.	2550.	284.	1408.	18035.	1.	145501.
2019	415.	2548.	283.	1411.	17939.	1.	147497.
2020	414.	2550.	282.	1437.	17806.	1.	149462.
2021	413.	2554.	282.	1480.	17667.	1.	151348.
2022	413.	2560.	282.	1531.	17506.	1.	153101.
2023	412.	2566.	282.	1580.	17341.	1.	154752.
2024	411.	2571.	282.	1621.	17174.	1.	156287.
2025	411.	2575.	282.	1652.	17011.	1.	157664.
2026	410.	2577.	282.	1669.	16862.	1.	158989.
2027	410.	2578.	282.	1675.	16730.	1.	160334.
2028	409.	2577.	282.	1671.	16629.	1.	161663.
2029	408.	2575.	282.	1659.	16556.	1.	163024.
2030	408.	2572.	282.	1640.	16531.	1.	164470.
2031	408.	2569.	282.	1619.	16549.	1.	165945.
2032	407.	2565.	282.	1597.	16612.	1.	167424.
2033	407.	2562.	282.	1577.	16714.	1.	168912.
2034	407.	2559.	282.	1562.	16844.	1.	170416.
2035	407.	2557.	283.	1552.	16978.	1.	171856.
2036	407.	2556.	283.	1546.	17098.	1.	173197.
2037	407.	2556.	283.	1546.	17197.	1.	174427.
2038	406.	2556.	283.	1550.	17269.	1.	175551.
2039	406.	2556.	284.	1557.	17316.	1.	176528.
2040	407.	2557.	284.	1567.	17342.	1.	177408.

1987	313709.	257.	442016.
1988	65782.	286.	82310.
1989	188538.	296.	231739.
1990	99513.	308.	114699.
1991	150207.	314.	172194.
1992	221583.	310.	251099.
1993	206327.	321.	226235.
1994	324056.	336.	337651.
1995	90314.	353.	90314.
1996	140489.	353.	140489.
1997	78374.	353.	78374.
1998	70956.	353.	70956.
1999	59833.	353.	59833.
2000	59984.	353.	59984.
2001	77623.	353.	77623.
2002	139460.	353.	139460.
2003	73949.	353.	73949.

FUTURE REPLACEMENTS FOR YEAR 2002:

YEAR	1995 DOLLARS	2002 DOLLARS
1996	87891.	
1997	91920.	
1998	95842.	
1999	99693.	
2000	103320.	
2001	106744.	
2002	110077.	
2003	113251.	131031.
2004	116249.	134500.
2005	119194.	137907.
2006	122057.	141220.
2007	124772.	144361.
2008	127212.	147185.
2009	129366.	149676.
2010	131154.	151745.
2011	132819.	153671.
2012	134506.	155624.
2013	136233.	157621.
2014	137994.	159659.
2015	139877.	161838.
2016	141833.	164101.
2017	143810.	166388.
2018	145846.	168744.
2019	147851.	171064.
2020	149819.	173341.
2021	151697.	175513.
2022	153437.	177527.
2023	155070.	179416.
2024	156590.	181175.
2025	157957.	182756.
2026	159276.	184282.
2027	160619.	185836.
2028	161949.	187376.
2029	163311.	188951.
2030	164749.	190615.
2031	166211.	192307.
2032	167677.	194003.
2033	169151.	195708.
2034	170640.	197431.
2035	172071.	199086.
2036	173403.	200628.
2037	174625.	202041.
2038	175742.	203333.
2039	176710.	204454.
2040	177582.	205462.
2041	178398.	206406.

2042	179160.	207289.
2043	180005.	208266.
2044	180878.	209276.
2045	181834.	210382.
2046	182841.	211547.
2047	183976.	212860.

FUTURE REPLACEMENTS FOR YEAR 2003:

YEAR	1995 DOLLARS	2003 DOLLARS
1996	87891.	
1997	91920.	
1998	95842.	
1999	99693.	
2000	103320.	
2001	106744.	
2002	110077.	
2003	113251.	
2004	116234.	137969.
2005	119180.	141467.
2006	122034.	144854.
2007	124732.	148057.
2008	127155.	150933.
2009	129285.	153462.
2010	131049.	155555.
2011	132687.	157500.
2012	134345.	159468.
2013	136039.	161479.
2014	137764.	163526.
2015	139613.	165720.
2016	141537.	168004.
2017	143486.	170318.
2018	145501.	172710.
2019	147497.	175079.
2020	149462.	177412.
2021	151348.	179650.
2022	153101.	181731.
2023	154752.	183690.
2024	156287.	185513.
2025	157664.	187148.
2026	158989.	188720.
2027	160334.	190316.
2028	161663.	191894.
2029	163024.	193510.
2030	164470.	195226.
2031	165945.	196977.
2032	167424.	198732.
2033	168912.	200499.
2034	170416.	202283.
2035	171856.	203993.
2036	173197.	205585.
2037	174427.	207045.
2038	175551.	208379.
2039	176528.	209539.
2040	177408.	210583.
2041	178232.	211562.
2042	179003.	212476.

2043	179850.	213481.
2044	180725.	214520.
2045	181686.	215662.
2046	182699.	216864.
2047	183838.	218216.
2048	185011.	219608.

## **CHAPTER 9**

### **Financial Risk and Mitigation**

#### **9.1 BACKGROUND**

BPA adopted a long-term policy in its 1993 Final Rate Proposal calling for setting rates that build and maintain financial reserves sufficient for the agency to achieve a 95 percent probability of meeting U.S. Treasury payments in full and on time for each two-year rate period. *See* 1993 Final Rate Proposal, Administrator's Record of Decision, WP-93-A-02 at page 72.

In 1996, the Comprehensive Review highlighted the need for a high Treasury payment probability (TPP) as part of a strategy to keep the benefits of the federal power system in the region. The Comprehensive Review recommendations were developed with three goals in mind. One of these goals was to “ensure repayment of the debt to the U.S. Treasury with a greater probability than currently exists . . .” At the time, BPA faced an 80 percent TPP for the upcoming 5-year rate period instead of the 88 percent TPP equivalent to the two-year TPP standard of 95 percent.

In this rate proposal, BPA for the first time has analyzed its transmission risks and is proposing risk mitigation tools designed to achieve the 95 percent probability standard for the transmission function.

To achieve this Treasury payment probability, the following risk mitigation “tools” are included in the rate proposal:

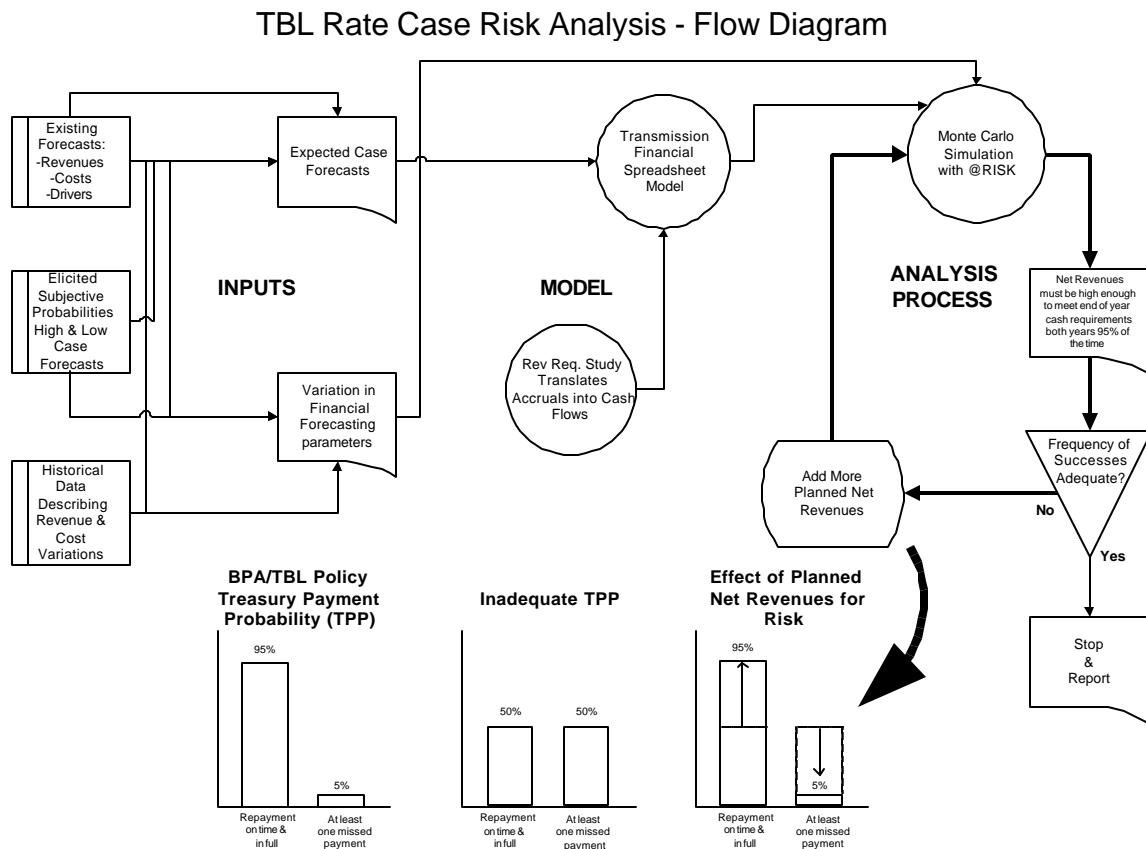
1. Starting reserves: Starting financial reserves include cash in the BPA Fund and the deferred borrowing balance attributed to the transmission function. The risk-adjusted values for starting reserves is projected to average \$26.9 million at the beginning of FY 2002.
2. Planned Net Revenues for Risk (PNRR). PNRR is a component of the revenue requirement that is added to annual expenses. PNRR adds to cash flows so that financial reserves mitigate short run cost and revenue risk and achieve the TPP goal.
3. Two Year Rate Period. A two-year rate period was adopted by BPA for transmission rates to cover a transition period during which an RTO may be formed in the Northwest. However, the ability to revise rates after two years, or more frequently if need be, serves as an important risk mitigation tool for BPA's transmission function. The impact of adopting rates for a two year rate period is to limit the effects of uncertainty which must be mitigated by other risk mitigation tools to the period of time from the date of the initial proposal through FY 2003. Longer run risks are mitigated by the ability to change rate levels.

## **9.2 TRANSMISSION RISK ANALYSIS**

To quantify the effects of risk on the finances of BPA's transmission function, BPA analyzes the effects of uncertainty in costs and revenues on transmission cash flows using a Monte Carlo simulation method. *See Figure 9.1.* The analysis is used to estimate the probability of successful Treasury payment on time and in full consistently during the rate period (FY 2002 and FY 2003). Successful Treasury payment occurs when the end of year cash reserve for the transmission function is at least sufficient to cover the TBL's working capital requirement of \$20 million per year. The working capital threshold was based on historical monthly net cash flow patterns and requirements for the TBL.

The risk analysis is used in an iterative process with the Revenue Requirements Study (RRS) and the Transmission Rate Study (TRS). The risk analysis uses inputs that come from both of these studies and contributes inputs to those studies in the form of PNRR. Initial input values for point estimates of costs and revenues come from the RRS and the TRS and when combined with inputs describing uncertainty in costs and revenues, provide the basis for the initial estimate of PNRR. The PNRR is in turn provided as an expense input to the RRS and the TRS, changing the transmission revenue requirement and transmission rates.

Figure 9.1



E. Westman(x8680) - 8/5/99

The adjusted transmission rates provide the basis for estimating expected revenues during the rate period for various transmission services. The revised estimates of expected revenues combined with the original uncertainties are used to update the risk analysis and the PNRR.

This iterative analysis process is continued until estimates of PNRR converge and additional iterations no longer change the estimate of PNRR. When successive changes in PNRR diminish the risk analysis process is halted and the final estimate of PNRR is used to set the PNRR expense for the RRS and TRS.

The risk analysis covers the period of FY 1999 through FY 2003. The analysis begins with a historical period, FY1999. The change in revenues, costs, and accrual to cash adjustments that are expected to occur between the time the initial rate proposal is developed and the end of the next rate period is analyzed. The advantage to this approach is that cash reserves at the end of the current rate period may be directly estimated, with uncertainty, to appropriately model the starting conditions for the next rate period. The amount of cash reserves at the start of the next rate period has a direct effect on the amount of PNRR needed to achieve BPA's TPP standard. The FY 1999 information reflects actual data, FYs 2000 and 2001 are transition years, and FYs 2002 and 2003 represent the next rate period. The transition year of 2001 is analyzed with uncertainty in revenues and costs so that uncertainty in cash reserves at the beginning of the next rate period (FYs 2002-2003) may be accounted for in the risk analysis.

### **9.3 TRANSMISSION RISK ANALYSIS PROCESSOR SPREADSHEET**

The foundation of the risk analysis is a transmission financial spreadsheet model, called the Transmission Risk Analysis Processor (TRAP). This model was developed in Microsoft Excel to estimate the effects of risk and risk mitigation on end of year cash reserves and likelihood of successful Treasury payment during the rate period. Cash reserve levels at the end of a FY determine whether BPA is able to meet its Treasury payment obligation. End of year cash balances during the rate period are therefore the main outcome of interest. The TRAP is organized as a "workbook" with individual work sheets including: an input matrix of revenues

and costs, an income statement, a cash flow statement, and individual work sheets for the variables specified with uncertainty in the model.

The calculation of end of year cash reserves starts with historical data on start of year cash reserves, revenues earned and expenses paid during FY 1999 (Table 9.5). Actual transmission revenues and expenses are based on BPA's 1999 Fourth Quarter Review results. The accrual based revenues and costs shown in the income statement are then converted to cash flows in the cash flow statement worksheet. The year-end cash balance in FY 1999 becomes the beginning year cash balance for FY 2000. The structure of the income statement and cash flow statement parallel those contained in the RRS. The net cash flow results in an estimate of the annual change in cash balance which, when added to the beginning cash balance, yields the year-end cash balance. Since no deferred borrowing occurs between 1999 and the end of 2003, the year-end cash balance is the total reserve at the end of the fiscal year. This flow of computations is repeated sequentially for each year from FY 1999 through FY 2003.

Simulating transmission cash flows in this manner permits the direct estimation of start of year reserves at the beginning of the rate period instead of defining FY 2002 start of year reserves as a stochastic variable, described by an input distribution in the analysis. TRAP estimates the start of year FY 2002 cash reserves based on transmission function historical cash flows, current forecasts of costs and revenues in FY 2000, and uncertainty in costs and revenues explicitly modeled for FY 2001 (Table 9.5). Table 9.5 shows the point estimate forecasts of expenses and revenues used in the RRS and TRS. In some cases these point estimates are different than the expected values for the same model inputs because the uncertainty surrounding the point estimates is not symmetric about the point estimate. Uncertainty was not modeled for FY 2000 since it is expected that little uncertainty will exist in costs and revenues by the time the final rates are determined and the Administrator's Record of Decision is adopted.

## **9.4 RISK ANALYSIS COMPUTER SOFTWARE**

The model used to perform the risk analysis was developed with Microsoft Excel, version 97, and @RISK, version 3.5. Microsoft Excel is a basic spreadsheet computer program and @RISK is an Excel add-in computer program available from Palisade Corporation. The @RISK software allows the user to develop models incorporating uncertainty in a spreadsheet computer program environment. Uncertainty is incorporated by specifying model variables as probability distributions that reflect the variability in a parameter of interest. With model parameters specified as distributions instead of as point estimates, @RISK samples values from the probability distributions and then carries out the spreadsheet computations. Randomly sampled sets of input values are drawn for each game in a Monte Carlo simulation process that involves computing results of large numbers of games in order to describe a distribution of outcomes or results, such as net revenues or cash reserves. The values sampled from the distributions are drawn with probability based on their relative likelihood of occurrence as specified in the input distributions. While @RISK provides tools that enable users to turn spreadsheet models into Monte Carlo simulation models, the user still has the burden of determining the input distributions for uncertain variables in the model. This is done in analyses external to the @RISK computer program.

## **9.5 RISK FACTORS**

Transmission risk factors used in the risk analysis include:

- (1) Network firm revenues;
- (2) Network hourly non-firm revenues;
- (3) Southern Intertie firm revenues;
- (4) Southern Intertie hourly non-firm revenues;
- (5) scheduling, system control & dispatch revenues;
- (6) reactive supply & voltage control revenues;

- (7) regulation & frequency response revenues;
- (8) Delivery segment revenues;
- (9) revenue from leasing dark fiber capacity;
- (10) total transmission expense annual variation, excluding between business line expenses paid to the PBL and Corporate expense;
- (11) BPA Corporate expenses paid by the transmission function;
- (12) effects of interest rates on interest expense associated with new borrowing; and
- (13) retained net proceeds from the sale of delivery facilities.

These are the model variables specified in the TRAP with uncertainty.

The risk factors analyzed were those judged to represent a significant impact on net revenues and cash flows, and that reasonably bear on estimating the amount of required PNRR during the next rate period. They are expected to influence beginning cash reserves at the start of the next rate period, as well. These risks are regarded as normal operating risks for the transmission function and mainly affect short-run variability in transmission cash flows between FY 2000 and FY 2003. Other long run risks such as variation in capital investment patterns, environmental effects on generation and load patterns that may change transmission costs and capacity availability, and potential changes in transmission industry structure due to formation of a Regional Transmission Organization are not included in the analysis. These exogenous risks are mitigated by the TBL's ability to change rate levels in response to fundamental changes in business environment and long term changes in cost structure.

BPA relied on two approaches to forecasting the uncertainty in risk factor variables chosen as in the TRAP. When historical data were present on which to base the estimation of uncertainty in a risk factor, BPA directly estimated the uncertainty or deviation in the historical data as the basis for forecasting the uncertainty in the risk factor. The underlying rationale for this approach is that the variation in the recent past is a reasonable basis for forecasting the short run future

(5 years or less). When historical data were not reasonably available, BPA relied on the judgement of staff familiar with specific areas of transmission risk as the basis for forecasting the uncertainty in those risk factors. In contrast to BPA's power rate case, the risk analysis for the transmission rate case does not rely on econometric models for forecasting the uncertainty due to various risk factors. Models with underlying economic behavior in model logic do not exist for the transmission function today. As a result, the transmission function relies on a statistical approach to estimating the uncertainty in risk factors when historical data are available. This distinction is similar to the difference between the disciplines of time series analysis and econometric modeling. Time series analysis methods do not attempt to explain underlying causality leading to variation, but instead rely strictly on the variation in the sample data from the past as an indication of the variation expected in the near term future. As in the field of econometrics, the reliance on a time series or statistical approach is dependent on the focus of the forecasting being short term rather than long term.

Uncertainty for some of the risk factors was defined in terms of proportional deviations from the point estimates (expected values) used in the RRS and TRS. This was done by transforming the estimated standard deviations from the historical data into proportional deviations relative to the historical means by dividing the standard deviation by the mean. Doing this permitted the calibrating the point estimates of expected revenues and costs used in the TRAP to the point estimates from the RRS and TRS without having to revise the model parameters that define the uncertainty in revenues and costs in the TRAP. The calibration of the risk analysis to the RRS and TRS ensures that the risk analysis is consistent with the assumptions underlying the RRS and TRS. Point estimate revenue forecasts from the TRS used for calibration purposes specifically exclude PNRR to avoid double counting PNRR in the risk analysis.

### *Network and Intertie Transmission Revenue Uncertainties*

Although the Network and Intertie rates are fixed during the rate period, the amount of revenue earned can be expected to vary due to uncertainty surrounding the quantity of service purchased by transmission customers. This is generally referred to as volumetric risk. Various underlying factors can effect the quantity of transmission service purchased. Some of these factors are related to weather patterns such as the effect of temperature upon electric load and precipitation upon stream flows, determining the amount of generation output at hydro facilities in the Northwest. The same kinds of factors in effect outside the Northwest can influence the amount of transmission purchased to move power between regions. Other factors such as growth rates in the regional economy also influence the quantity of electricity usage and the amount of transmission needed to serve the demand for electricity. Within BPA's power functions, there is a long history of modeling and analysis aimed at understanding the effects of these factors on the demand for electricity, both at the retail and wholesale level. However, the same history does not exist for BPA's transmission function, necessitating another means for forecasting the variability in the volume of transmission services sales and resultant revenues.

One source of information available for assessing transmission service volumetric risk is historical usage of the transmission system, called Total Transmission System Load or TTSL. This source of information approximates hourly loading for the transmission system defined as a whole, including the effects of interchange loads. Although these data are available over a period going back to 1985, the data are not defined and collected by segment (Network versus Intertie) or by type of service (e.g., point to point versus network integration service). The other shortcoming of historical usage data is that customers generally buy firm transmission capacity on a take or pay basis and do not always use all of the capacity that they are entitled to use. They do however pay for all of the capacity they've reserved. As a consequence, transmission usage statistics are not a good predictor of variability in transmission service revenues and can be expected to overstate the uncertainty in transmission service revenue.

Ideally, at least a decade of historical transmission billings data could be used to extrapolate future variation in transmission revenues. Unfortunately, prior to 1997, BPA billed most customers for delivered power with transmission charges embedded in the delivered bill amount. Even the bills for wheeling customers for this period an incomplete picture of the patterns of monthly and annual transmission revenues earned by BPA. So much has changed affecting the operation of BPA's transmission function since the 1992 Energy Policy Act and more recent FERC open access transmission orders that relatively little useful historical data are available on which to base forecasts of revenue uncertainty.

Data were available for 24 months of billed transmission revenue, by segment and type of service, for FYs 1998 and 1999. If only the annual data could be used to estimate revenue variations, this analysis would be limited to only two years of annual bills. Two observations are not sufficient to estimate the standard deviation for annual revenues. An alternative method is to use data based on the monthly observations. Although an approximation of annual variability the method focuses on the 24 monthly observations as a sample of revenues that does still reflect underlying factors, such as weather and economic activity, that drive customer transmission demand. Each of the 24 monthly observations is a consequence of those factors at play in each month of the two fiscal years for which BPA has consistently reported revenue data. The values for these months represent a sample distribution of monthly transmission revenues. For the 24 historical months for which data were available, the absolute range of monthly revenues, the minimum monthly revenue and the maximum monthly revenue are known for that period. The average monthly transmission revenue and the total annual transmission revenue can be estimated as well. The frequency with which revenues fall within particular ranges of revenue as an indication of the frequency or probability that values will occur in future near term months. A histogram can be constructed based on the historical data that shows the frequency distribution for different ranges of transmission revenue by type of service. However,

the number of observations remains limited and the precision with which one may describe an estimate of the underlying distribution is not great.

In order to maximize the value of the limited data available, BPA adopted a statistical technique referred to as “the bootstrap.” Dr. Bradley Efron developed this technique at Stanford University in 1977. The bootstrap is one of a variety of statistical techniques referred to under the heading of “resampling.” The techniques rely on the use of repeated samples drawn, in the case of the bootstrap, with replacement from sample populations for the purposes of building simulated data sets with much larger sample sizes used to empirically estimate measures of statistical inference, such as means, standard errors, or confidence intervals.

The purpose of the bootstrap is to enable the analyst to make statistical inferences without the necessity of the traditional distributional assumption of normality. The bootstrap instead treats the sample as a direct analogy to the population and then empirically estimates the statistic’s sampling distribution. BPA used the bootstrapping technique to empirically build a sample distribution of annual network firm revenues by drawing a large number of replicate random samples (5000) of sample size 12 (for the number of months in a year) from the original sample distribution of 24 historical monthly revenues for which the statistic annual Network firm revenue is estimated. The resulting frequency distribution of 5000 annual Network firm revenue samples is an estimate of the sampling distribution of annual Network firm revenues based on FY 1998 and 1999 monthly Network firm revenues. The sampling distribution allows an estimate to be made of the uncertainty associated with the statistic annual Network firm revenue. The bootstrap treats the sample (24 monthly revenues) as the population. *See* Efron, B. 1993, *An Introduction to the Bootstrap*, Chapman & Hall/CRC, Boca Raton; and Mooney, C. and R. Duval 1993. *Bootstrapping: A Nonparametric Approach to Statistical Inference*, Sage Publications, Newbury Park.

The bootstrap estimated sampling distributions for Network and Southern Intertie annual firm revenues and annual hourly nonfirm revenues were used to select @RISK sampling distribution functions and input parameters for these transmission revenue categories. Network and Southern Intertie annual firm revenue uncertainties were described with a normal distribution, while annual hourly nonfirm revenue uncertainties were described using the log normal distribution. In both cases a mean and standard deviation were required to specify the distribution. The forecasted point estimates of revenues from the TRS were used for the mean and the standard deviation was based on the bootstrap sampling distributions. The specific input values for the Network and Intertie Revenue Risks are in Tables 9.9 and 9.10 respectively.

Although the bootstrap is a relatively recent nonparametric technique for statistical inference, it is applied today elsewhere in electric transmission industry. The bootstrap is used by the TBL System Operations and Planning Group to estimate “control limits” for quality assurance, that describe the normal range of variation expected in transmission outage frequency and duration. Control limits are just like confidence intervals for statistical inference. The TBL adopted this technique following the same practice established by the California Independent System Operator (CAISO). The use of the bootstrap to set control limits, or “Control References” is also contained in the WSCC proposal for procedures for measuring and reporting transmission availability under the Reliability Management System.

#### *Delivery Segment Revenues*

Uncertainty in delivery segment revenues was estimated in the same manner as the uncertainty in transmission for the Network and Intertie segments. . The bootstrap technique was applied to the 24 monthly historical observations from FYs 1998 and 1999 to generate a simulated sample distribution used to specify the rate period uncertainty in delivery segment revenues. The specific input values for Delivery Segment Revenue risk are presented in Table 9.12.

### *Fiber Revenues*

The probabilities and deviations for the risks associated with Fiber Revenue Risks were developed by members of TBL transmission staff responsible for fiber optics program. These subject-matter experts developed the distribution of future revenues associated with the lease of dark fiber capacity surplus to BPA's operational needs during the next rate period. The specific input values for Fiber Revenue Risks are presented in Table 9.13.

### *Transmission Operations and Maintenance Expense*

The uncertainty in transmission O&M expense was estimated using 21 years of historical data from FY 1978 through FY 1998. Historical expense data were only available for the total of O&M expense. It was assumed that the variety of factors that have influenced year to year variations in transmission O&M expense in the historical period can reasonably be expected to prevail during the future, particularly the near term future. Like transmission revenues, the objective was to describe short run volatility and not long run variability or variation in trend that may be due to factors, such as, changes in the structure of the transmission industry in the Northwest. Such long-term changes are expected to be mitigated by the ability to change rate levels. Because the risk analysis is a short run analysis, long-term trend variation was not directly estimated. Instead, the short run volatility in expense was applied to the expected forecasts, which include an expectation of expense trends. To estimate the short run variability in expense the trend in the data was first removed, and then the variation in the historical data was estimated. The trend in the historical data was removed by first fitting a Lowess smooth curve to the data. The Lowess smooth is a robust non-parametric smooth that is insensitive to outliers and not dependent on underlying parametric distribution assumptions. A nonlinear curve could be ascribed to the data to represent the long-term trend in total O&M expense. The trend was then subtracted from the historical observations and the resulting data, or residuals, were used to estimate the standard deviation for total O&M expense.

Since the TRAP includes subcategories of transmission O&M expense with forecasted point estimates of expenses, the volatility in total O&M expense was distributed proportionally based on the relative size of individual expense categories to the total O&M expense. Individual expense category point estimates could be revised without compromising the integrity of the uncertainty in expenses quantified on the basis of historical variation in total O&M expense. The variation associated with individual categories of expenses cannot be assumed to be the same as the uncertainty in total O&M expense. The specific input values for Transmission O&M Expense are shown in Table 9.9.

Finally, two other categories of expenses were analyzed using different methods and were separated from the analysis of transmission O&M expense. The categories include was Corporate overhead expenses paid by BPA's TBL, and inter-business line expenses, comprised primarily of the expense for generation inputs for ancillary services

#### *Corporate Expense*

An estimate for Corporate expense was determined jointly by Corporate services and TBL. The distribution assumption underlying the uncertainty in this category of expense is proportional to the assumption used in the power rate case, adjusted by TBL's expectations of the use of overhead services and expenses associated with those services. The uncertainty in Corporate expenses follows the assumptions used in BPA's power rate case, based on expectations of the likelihood of being able to achieve the BPA Cost Review recommendations for efficiency improvements in administrative and internal support services costs. The point estimates used in determining the revenue requirement include an estimate of Corporate expense, including Shared Services expense that is based on a "stretch target" budget forecast. This means that the likelihood of this expense exceeding the forecast is higher than under running the forecast.

*See Risk Analysis Study Documentation, Chapter 2, Attachment 1, WP-02-E-BPA-03A.*

The initial proposal forecast of transmission's Corporate and Shared Services expense is \$30 million in FY 2002 and \$28.1 million in FY 2003. The estimate of the expected expense is \$2 million higher than the point estimate budget forecast used in the Revenue Requirements Study to reflect the uncertainty surrounding this expense budget. The uncertainty is modeled as an uncertain deviation in Corporate overhead expense that is applied to the Corporate overhead expense point estimate. The @RISK function RiskDiscrete was used to specify this uncertainty and the input parameters are shown in Table 9.8.

#### *Ancillary Services Revenue*

The risk associated with TBL's inter-business line expense is implicitly treated in the ancillary services revenue risk assessment. Three of the six ancillary services revenue categories were modeled with uncertainty in the risk analysis. They are 1) Scheduling, System Control, and Dispatch; 2) Reactive Supply & Voltage Control from Generation; and 3) Regulation and Frequency Response Service. The remaining three ancillary services revenues were treated as either risks borne by BPA's power marketing function because the transmission function only buys what it sells or the amount of revenue expected to be earned from the sale of the service was too small to warrant modeling revenue uncertainty.

Scheduling, System Control and Dispatch is a surcharge on transmission rates and transmission customers are not permitted to self supply this service. There is no price risk since the rate for this service is set in the rates process. The volumetric risk is assumed to vary in a manner directly proportional to the uncertainty in the total of transmission revenue. Since the majority of transmission wheeling revenue uncertainty is modeled as a normal distribution, Scheduling, System Control and Dispatch uncertainty is assumed to be normally distributed with mean equal to the point estimate forecast for revenues from the TRS and standard deviation equal to 1.6% of mean forecasted revenue. The standard deviation is based on the simulated variation of total

Network and Southern Intertie revenues from the TRAP. This revenue uncertainty is modeled with the @RISK function RiskNormal. See Table 9.11.

Reactive Supply and Voltage Control service is also a mandatory service required for each transmission transaction. This service must be acquired from TBL unless the transmission customers demonstrates that it can self supply a portion of its requirements. This results in a larger down side revenue risk for this ancillary service compared with Scheduling, System Control and Dispatch service. BPA's TBL does not have prior experience selling a Reactive Supply and Voltage Control ancillary services. It is also difficult to quantify the uncertainty in future revenues expected from services like Reactive Supply and Voltage Control where customer's ability to self supply poses a clear risk. As a result the @RISK function RiskTriang was adopted to quantify the uncertainty in this revenue as a triangular distribution with inputs defining the minimum revenue, the most likely revenue and the maximum revenue. The @RISK program identifies the triangular distribution for applications where little data is available and where only rough estimates of uncertainty are feasible. The input assumptions were obtained from TBL staff familiar with the ancillary services tariffs and rates. The most likely revenue input is the point estimate used in the RRS and the minimum and maximum values are found in Table 9.11.

Regulation and Frequency Response service is a load-based service that is only applied to load in BPA's control area. The amount of revenue earned from this service is dependent on the amount of load that exists within TBL's control area and the rate of load growth. Similarly, the TBL adopted the triangular distribution as a means of approximating the uncertainty that is expected to be associated with revenues earned from this service. TBL staff familiar with ancillary services based their estimate of the variation in Regulation and Frequency Response revenue on their assessment of the potential for load leaving the TBL's load control area and potential for load growth. The estimated variation defined the minimum revenue and maximum

revenue for this service. The specific input values for the @RISK RiskTriang function are in Table 9.11.

#### *Interest Rate Risk*

Annual volatility in Treasury borrowing rates can effect short run interest expense for new debt required to finance transmission capital program additions. This effect was modeled by defining Treasury borrowing rates as an uncertain variable using the same distribution assumptions as in BPA's power rate case and estimating the effects of the uncertain interest rates on incremental transmission interest expense each year from FY 2001 through FY 2003. *See* Risk Analysis Study Documentation, Chapter 2, WP-02-E-BPA-03A. In each year a randomly sampled interest rate is drawn in each game for the debt added in that year. The extent to which the interest rate is above or below the expected rate determines whether there is an increase or decrease in interest expense compared to the expected interest expense for that new investment. The change in interest expense applies only to the new debt for the year in which the debt was incurred and for subsequent years during which interest payments are made on the debt. Since new debt is assumed to be issued midway through the fiscal year, the interest expense deviation for the first year is only half of the total interest expense deviation expected to occur for an entire year. The entire deviation in interest expense affects subsequent years. New debt in each successive year is treated similarly. Randomly sampled interest rates are drawn independently for each year in which new debt is added and for each game of the simulation in the TRAP. The specific input values for Interest Rate Risk are shown in Table 9.14.

#### *Sale of Delivery Facilities Risk*

Transmission customers who take service through delivery facilities the opportunity to acquire those facilities instead of paying the Delivery charge. BPA sold roughly 45 substations by the end of FY 1998. The proceeds from these facilities have in some instances exceeded the book value of the facilities. More sales are expected through the rate period. There is uncertainty in

the pricing of the facilities that BPA expects will be sold and therefore uncertainty in the amount of proceeds from those future sales. The net proceeds over depreciated book value of any facilities sold will be applied to the transmission function's share of cash reserves for the upcoming rate period. The net proceeds therefore affect transmission cash reserves at the beginning of the next rate period, as well as the need for PNRR. Given this relationship, the net proceeds from the sale of facilities was modeled as an uncertain variable in TRAP. The uncertainty in net proceeds from the sale of facilities was estimated based on the judgement of staff directly involved in the sale of facilities. That assessment takes into account affects of the number of facilities that may be sold and the potential for differences between sale price and book value of the facilities. The specific input values for Sale of Facilities Net Proceeds Risk are shown in Table 9.15.

## **9.6 RISK CORRELATIONS**

The TRAP models revenue and cost risks as diversified risks. The chances of outcomes for individual risk factors are therefore independent of each other. The result is that the chance of consistently good luck or consistently bad luck across all of the risks is very low. More frequently in any individual simulation game the chances are that some other risks will harm the TBL's financial reserves while other will benefit or increase financial reserves. However, the TPP standard is focused on the downside risk or the chances of the TBL not being able to meet its Treasury payment obligations.

If there were significant correlations between risk factors the assumption of diversified risks could serve to either bias the risk analysis in the direction of excessive risk mitigation or insufficient risk mitigation depending on the direction of the correlation. Risks can either be positively correlated or negatively correlated. Where data were available BPA analyzed risk

factor correlation and found no compelling basis for explicitly modeling the effects of risk correlations in the TRAP. Because the underlying uncertainties may not be normally distributed, BPA used both Pearson's correlation coefficient and the Spearman Rank Order correlation coefficient method to evaluate risk correlations (Table 9.2 and 9.3). Correlations were not large enough in either case to warrant modeling them in the TRAP.

## **9.7 RISK ANALYSIS RESULTS**

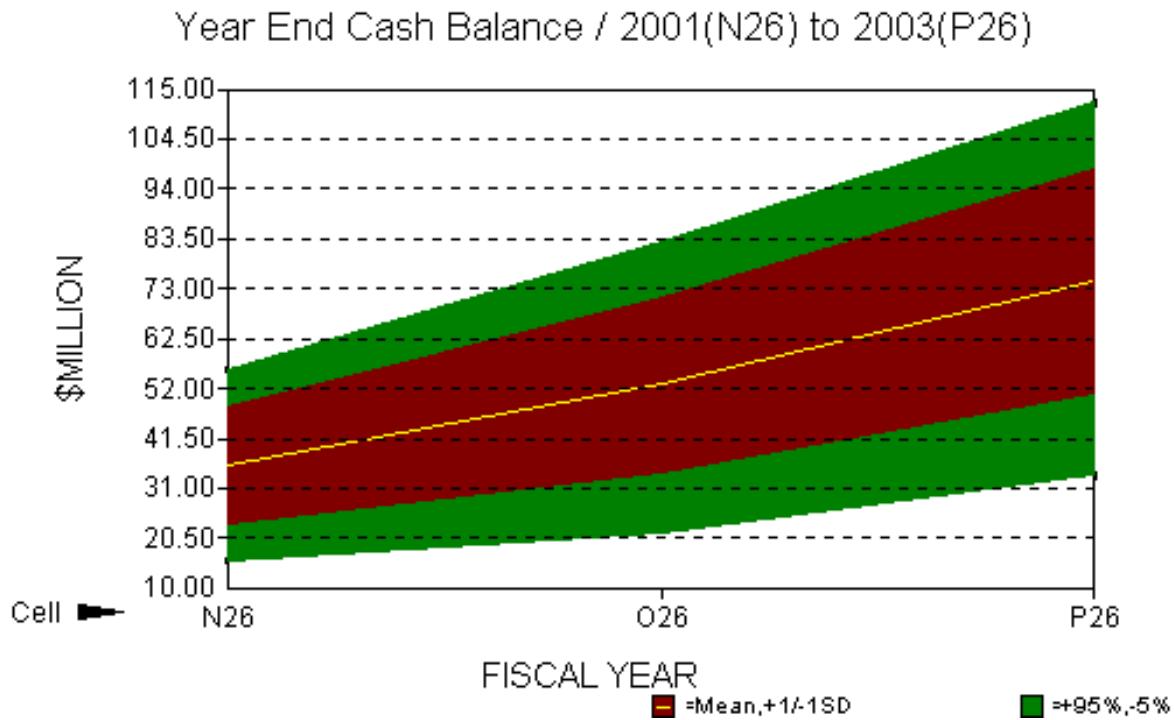
The transmission risk analysis simulation completed in the iterative process with the RRS and the TRS resulted in 2,851 games out of 3000 in which end of year financial reserves were sufficient in both years of the rate period to successfully meet BPA's obligation to pay Treasury on time and in full. This represents a 95% TPP for the FY 2002 through 2003 rate period. These results were obtained with a pseudo random number seed value of 20 and the @RISK sampling option set for Latin Hypercube sampling. This option uses stratified random sampling of the risk factor sampling distributions instead of strict random sampling. This method is considered a more efficient method by ensuring that the full range of the sampling distribution is represented in the set of sampled values for a given number of simulation games.

### *Financial Reserves and PNRR*

The expected year-end cash balances for FYs 2002 and 2003 are estimated to be \$48.0 million and \$77.8 million, respectively (Table 9.7). The year-end cash balance at the end of the second year of the rate period is higher than the first year. The growth in year-end cash balance is principally due to the fact that a single rate level is set for both years of the rate period, and there is additional upward pressure on PNRR in the first year of the rate period caused by insufficient year-end cash balances expected to occur by the end of the current rate period. Factors that determine the PNRR for the FY 2002 – FY 2003 rate period are the need to both cover risk in the rate period and the need to make up for any shortfall in reserves accumulated

in the current rate period. The shortfall in reserves for the current rate period is presented in Figure 9.2, which shows the 95 percent confidence limits on year-end cash balance for FY 2001 through FY 2003. Since the lower limit falls below the \$20 million working capital requirement at the end of FY 2001 more frequently than 5 percent of the time,

Figure 9.2



Treasury payments at the end of FY 2002 would either be missed or not made in full more than 5 percent of the time if PNRR were established at a level sufficient to cover only risks during FY 2002. The pressure on PNRR from the transition years continues to affect year-end cash balance in FY 2003 because a single transmission rate that included PNRR is set for both years of the next rate period. Another way of describing this outcome is that the TPP in FY 2001 is below 95 percent thereby affecting the PNRR for FY 2002 and 2003.

### *Planned Net Revenues for Risk*

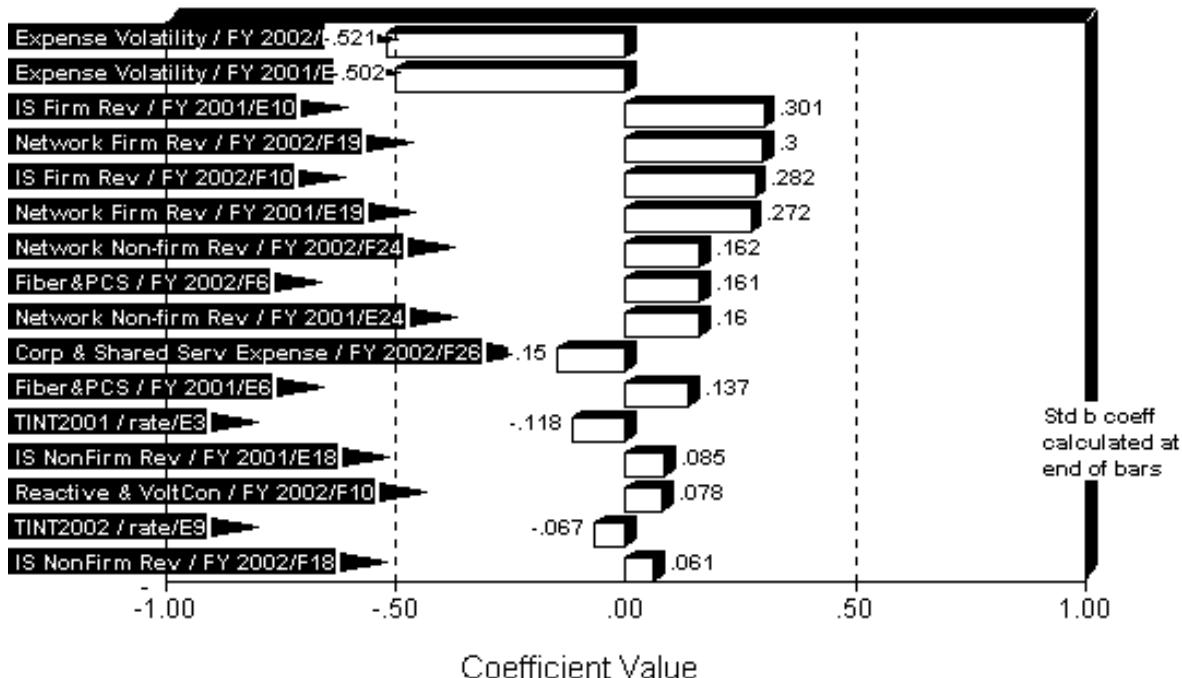
In order to achieve a 95% TPP, the transmission function estimated in the risk analysis that it requires additional net revenue, called Planned Net Revenue for Risk, in addition to the financial reserves that it expects to hold by the end of the current rate period, plus the net revenues that are expected to be earned without the PNRR. The required PNRR for FY 2002 and 2003 are \$10.75 and \$9.83 million, respectively. These amounts are included in the transmission revenue requirement as shown in Table 4.1A of the RRS.

## **9.8 INFLUENCE OF RISK FACTORS**

The significance of various risk factors in determining the TPP can be seen in figure 9.3. This figure shows normalized regression coefficients for each risk factor identified. The @RISK computer program provides this diagnostic feature as part of the simulation system. A value of zero indicates that there is no significant relationship between the risk factor and the rate period TPP. A value of one indicates that a one standard deviation change in rate period TPP occurs for a one standard deviation change in the risk factor. Negative values indicate inverse relationships between TPP and risk factors.

Figure 9.3

Regression Sensitivity for Year End Cash Balance  
Fiscal Year 2002



@RISK ranks risk factors displayed in order of their impact on an outcome of interest, in this case TPP. Risks with the largest effects are listed first with others following in order of decreasing effect on TPP. The figure shows that expense volatility during the rate period contributes more of the uncertainty in transmission financial reserves than other factors. Firm transmission revenue risks are the next largest risk factors because, despite the modest variation in year to year firm revenues, this category of revenue represents a large share of total transmission revenue.

**TABLE 9.1: TBL Monthly Revenues Fiscal Year 1998 Through Fiscal Year 1999.**

Fiscal Year	Month	IS Firm	IS NonFirm	Network Firm	Network NonFirm	Delivery Segment
1. 1998	Oct	\$3,785,865	\$204,946	\$28,247,823	\$1,460,507	\$1,856,510
2. 1998	Nov	\$3,931,972	\$364,296	\$27,757,159	\$1,367,711	\$1,572,698
3. 1998	Dec	\$4,222,016	\$135,414	\$31,035,381	\$722,910	\$1,786,286
4. 1998	Jan	\$3,966,324	\$33,363	\$30,140,261	\$732,968	\$1,959,539
5. 1998	Feb	\$3,815,927	\$167,289	\$29,640,042	\$897,848	\$1,830,378
6. 1998	Mar	\$3,528,648	\$311,487	\$30,431,843	\$575,144	\$1,656,320
7. 1998	Apr	\$5,108,627	\$143,745	\$28,324,352	\$672,204	\$1,374,036
8. 1998	May	\$5,674,996	\$97,098	\$28,948,419	\$881,297	\$1,492,878
9. 1998	Jun	\$4,566,511	\$210,071	\$29,460,531	\$2,041,663	\$1,494,661
10. 1998	Jul	\$5,900,923	\$213,277	\$29,742,962	\$1,086,404	\$1,479,602
11. 1998	Aug	\$7,493,556	\$155,991	\$33,702,236	\$957,199	\$1,789,471
12. 1998	Sep	\$5,590,485	\$97,942	\$27,148,031	\$277,736	\$1,616,191
13. 1999	Oct	\$3,750,787	\$98,044	\$27,400,615	-\$176,533	\$1,612,522
14. 1999	Nov	\$3,488,611	\$264,812	\$26,148,503	\$268,823	\$1,339,489
15. 1999	Dec	\$3,383,447	\$230,751	\$29,536,010	\$807,826	\$1,978,827
16. 1999	Jan	\$3,456,999	\$1,082,044	\$29,485,914	\$3,546,397	\$1,692,691
17. 1999	Feb	\$4,056,416	\$285,861	\$30,180,462	\$1,700,501	\$1,627,405
18. 1999	Mar	\$5,296,298	\$90,529	\$29,417,463	\$2,371,597	\$1,545,525
19. 1999	Apr	\$5,627,876	\$171,042	\$30,281,774	\$661,460	\$1,506,312
20. 1999	May	\$6,703,886	\$152,299	\$31,441,546	\$382,794	\$1,467,091
21. 1999	Jun	\$6,017,799	\$227,588	\$29,396,937	\$874,722	\$1,474,063
22. 1999	Jul	\$6,750,222	\$814,170	\$29,279,792	\$612,589	\$1,227,898
23. 1999	Aug	\$6,283,334	\$247,450	\$28,234,214	\$545,791	\$1,333,633
24. 1999	Sep	\$5,929,036	\$239,273	\$26,651,945	\$552,701	\$1,341,653

**TABLE 9.2: Correlation Matrix for TBL Monthly Revenue (Fiscal Year 1998 - 1999)**

	Netfirm	NetNonFirm	IS Firm	ISNonFirm	Delivery
1. Netfirm	1	0.182	0.307	-0.032	0.394
2. NetNonFirm	0.182	1	-0.227	0.521	0.177
3. IS Firm	0.307	-0.227	1	-0.095	-0.504
4. ISNonFirm	-0.032	0.521	-0.095	1	-0.194
5. Delivery	0.394	0.177	-0.504	-0.194	1

**TABLE 9.3: Spearman's Rank Order Correlation Matrix for TBL Monthly Revenue (Fiscal Year 1998 - Fiscal Year 1999)**

	Netfirm	NetNonFirm	IS Firm	ISNonFirm	Delivery
1. Netfirm	1	0.287	0.118	-0.110	0.426
2. NetNonFirm	0.287	1	-0.143	0.105	0.391
3. IS Firm	0.118	-0.143	1	-0.166	-0.557
4. ISNonFirm	-0.110	0.105	-0.166	1	-0.194
5. Delivery	0.426	0.391	-0.557	-0.194	1

**TABLE 9.4: TRANSMISSION O&M EXPENSE VARIABILITY**

A Fiscal Year	B Transmission Total O&M Expense (\$1,000)	C Lowess Smoothed O&M Expense (Tension = 3.5)	D Residuals Col. B - C
1. 1978	69,767	68,609	1,158
2. 1979	73,801	74,249	(448)
3. 1980	77,594	79,973	(2,379)
4. 1981	87,243	85,769	1,474
5. 1982	91,562	92,456	(894)
6. 1983	99,520	100,623	(1,103)
7. 1984	101,406	115,629	(14,223)
8. 1985	141,623	128,408	13,215
9. 1986	144,438	142,855	1,583
10. 1987	148,596	153,632	(5,036)
11. 1988	167,102	163,955	3,147
12. 1989	175,240	175,073	167
13. 1990	183,512	186,369	(2,857)
14. 1991	199,668	194,477	5,191
15. 1992	209,868	197,571	12,297
16. 1993	189,926	200,226	(10,300)
17. 1994	202,309	199,830	2,479
18. 1995	200,501	201,302	(801)
19. 1996	202,730	207,468	(4,738)
20. 1997	197,259	214,566	(17,307)
21. 1998	228,803	221,926	6,877
22. Mean	152,022		(595)
23. Std. Dev.	52,903		7,373

**TABLE 9.5: Data Matrix**

<b>TBL Risk Analysis</b> (\$1,000)	FY 1999 (Actuals)	FY 2000 (Transition)	FY 2001	FY 2002	FY 2003
				(Rate Period)	
<b>Transmission Revenues</b>					
1. Network Firm Revenues	320,055	325,941	332,056	386,100	387,649
2. Network NonFirm Revenues	12,325	12,614	14,000	14,591	14,651
3. Intertie Firm Revenues	60,745	61,924	63,000	65,676	63,373
4. Intertie NonFirm Revenues	3,904	4,000	5,200	4,513	4,355
5. Ancillary Services Revenues	28,739	28,487	28,487	144,153	144,899
6. Delivery Segment Revenues	31,515	24,956	25,591	17,333	19,842
7. Fiber & PCS Revenues	6,593	24,000	29,500	23,140	28,660
8. Other Revenues	78,125	45,710	47,109	37,177	30,530
9. NR Adjust to meet Exp Min Cash Flow				-	-
10. <b>TBL Planned NR for Risk</b>				10,751	9,829
11. Total Operating Revenues	542,000	527,632	544,942	703,434	703,788
Total Oper Revs w/o Cash Adj & PNRR				692,683	693,959
<b>Transmission Expenses</b>					
12. Transmission G&A	13,700	18,700	21,100	22,200	23,800
13. Transmission Marketing and Scheduling	13,500	17,700	15,500	15,246	15,703
14. Transmission System Operations	27,300	29,200	31,100	30,996	32,106
15. Transmission System Maintenance	64,100	67,300	69,100	71,300	73,400
16. Transmission System Development	11,500	16,000	19,400	23,739	23,939
17. Support Services	10,000	12,700	12,500	11,890	12,246
18. Environment	5,400	5,000	5,000	5,100	5,300
19. TBL Corporate Expenses	31,000	36,000	34,300	30,000	28,100
20. Between Business Line Expenses	39,500	37,900	38,900	84,277	84,244
21. TBL Pension Expense	2,100	3,000	3,950	27,600	17,600
22. Total System Operation & Maint	218,100	243,500	250,850	322,348	316,438
23. Interest on Long-Term Debt (Treasury)	196,200	112,568	125,647	143,126	143,418
24. Capitalization Adjustment - Transmission	19615	19720	20763	19618	20174
<b>Capital Outlays and Financing</b>					
25. Transmission Plant in Service	120,551	171,139	244,230	251,069	324,700
26. Total Transmission Outlays	120,551	171,139	244,230	251,069	324,700
27. revenue financing	-	-	-	-	-

**TABLE 9.6: Statement of Revenues and Expenses - Transmission Business**

(\$ millions)	1999	2000	2001	2002	2003
<b>Operating Revenues</b>	(Actuals)				
1. Transmission Revenues	397.0	404.5	417.7	477.4	476.9
2. Ancillary Services Revenues	28.7	28.5	28.5	144.0	145.6
3. Delivery Segment Revenues	31.5	25.0	25.6	17.7	20.2
4. Fiber & PCS Revenues	6.6	24.0	19.1	21.8	26.7
5. Other Revenues & Credits	78.1	45.7	47.1	37.6	30.9
<b>6. Total Operating Revenues</b>	<b>542.0</b>	<b>527.6</b>	<b>538.0</b>	<b>698.5</b>	<b>700.3</b>
 <b>Operating Expenses</b>					
7. Transmission G&A	13.7	18.7	21.1	22.2	23.8
8. Transmission Marketing and Scheduling	13.5	17.7	15.5	15.2	15.7
9. Transmission System Operations	27.3	29.2	31.1	31.0	32.1
10. Transmission System Maintenance	64.1	67.3	69.1	71.3	73.4
11. Transmission System Development	11.5	17.7	19.4	23.7	23.9
12. Support Services	10.0	12.7	12.5	11.9	12.2
13. Environment	5.4	5.0	5.0	5.1	5.3
14. Corporate Expenses	31.0	36.0	34.3	32.0	30.1
15. Between Business Line Expenses	39.5	37.9	38.9	84.3	84.2
16. CSRS Pension Expense	2.1	3.0	4.0	27.6	17.6
<b>17. Total System Operation &amp; Maintenance</b>	<b>218.1</b>	<b>245.2</b>	<b>250.9</b>	<b>324.3</b>	<b>318.4</b>
<b>18. Net Operating Margin</b>	<b>323.9</b>	<b>282.4</b>	<b>287.2</b>	<b>374.2</b>	<b>381.8</b>
19. Federal Projects Depreciation	127.9	134.9	139.9	182.7	195.4
<b>20. Total Operating Expenses</b>	<b>346.0</b>	<b>380.1</b>	<b>390.8</b>	<b>507.0</b>	<b>513.8</b>
<b>21. Net Operating Revenue</b>	<b>196.0</b>	<b>147.6</b>	<b>147.2</b>	<b>191.5</b>	<b>186.5</b>
 Interest Expense					
22. Interest on Appropriated Funds	0.0	73.0	71.6	66.9	65.3
23. Interest on Long-Term Debt Issued to Treasury	196.2	112.6	125.6	143.1	143.4
24. Interest Credit on Cash Reserves				(5.7)	(7.6)
25. Amortization of Capitalized Bond Premiums				3.2	3.2
26. Capitalization Adjustment	(19.6)	(19.7)	(20.8)	(19.6)	(20.2)
27. AFUDC	(3.0)	(4.4)	(4.7)	(5.0)	(5.2)
 28. Net Interest Expense	173.6	163.1	172.2	182.9	178.9
<b>29. Total Operating &amp; Net Interest Expenses</b>	<b>519.6</b>	<b>543.2</b>	<b>563.0</b>	<b>689.9</b>	<b>692.7</b>
 <b>30. Net Revenues</b>	<b>22.4</b>	<b>(15.6)</b>	<b>(25.0)</b>	<b>8.6</b>	<b>7.6</b>

**TABLE 9.7: Statement of Cash Flows - Transmission Business**

(\$ millions)	1999	2000	2001	2002	2003
<b>Cash Provided by Current Operations</b>					
1. Net Revenues	22.4	(15.6)	(25.0)	8.6	7.6
Expenses not Requiring Cash					
2. Depreciation/Amortization	127.9	134.9	139.9	182.7	195.4
3. Amort of Capitalized Bond Premiums	4.2	4.1	3.2	3.2	3.2
4. Capitalization Adjustment	(19.6)	(19.7)	(20.8)	(19.6)	(20.2)
5. Accrual Revenues (AC Intertie & Fiber)	(3.5)	(3.5)	(3.5)	(4.0)	(4.0)
6. Retained Net Proceeds from Sale of Facilities			11.0		
7. Clark Settlement	2.5	1.5	0.7		
8. Cash Provided by Current Operations	<u>133.9</u>	<u>101.7</u>	<u>105.6</u>	<u>170.8</u>	<u>182.0</u>
<b>Cash Used for Capital Investments</b>					
Investment in					
9. Gross Utility Plant and CWIP	(120.6)	(171.1)	(244.2)	(252.3)	(248.4)
10. Cash Used for Capital Investments	<u>(120.6)</u>	<u>(167.9)</u>	<u>(244.2)</u>	<u>(252.3)</u>	<u>(248.4)</u>
<b>Cash From Borrowing and Appropriations</b>					
11. Increases in Long-term Debt & Appropriations	131.4	167.9	244.2	252.3	248.4
12. Repayment of Long-term debt	(96.7)	(92.5)	(12.3)	(124.2)	(124.2)
13. Repayment of Capital Appropriations	(41.9)	(22.1)	(46.8)	(23.9)	(26.2)
14. Subtotal Cash from Borrowing & Approp	(7.2)	53.3	185.2	104.2	97.9
15. <b>Annual Change in Cash Balance</b>	<b>6.1</b>	<b>(12.9)</b>	<b>46.6</b>	<b>22.7</b>	<b>31.5</b>
16. Plus Beginning Cash Balance	(12.9)	(6.8)	(19.7)	26.9	49.6
17. Year End Cash Balance	(6.8)	(19.7)	26.9	49.6	81.1
18. Deferred Borrowing	0.0	0.0	0.0	0.0	0.0
19. Total Reserves	<u>(6.8)</u>	<u>(19.7)</u>	<u>26.9</u>	<u>49.6</u>	<u>81.1</u>

20. Treasury Payment Indicator for Individual Years (1 = Yes, 0 = No):	1	1
21. Treasury Payment Indicator for the FY 2002 - 2003 Rate Period (1 = Yes, 0 = No):	1	1

**TABLE 9.8: Transmission Expense Risk**

	Operating Expenses (\$1,000)	(Actuals)		(Transition)		(Rate Period)	
		FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	
1.	<b>Trans O&amp;M Expense Change From Exp Value</b>			0.0	0.0	0.0	
2.	Total Trans O&M Expense (With Uncertainty)			173,700	180,471	186,494	
3.	Transmission O&M Expense Standard Deviation			9,206	9,565	9,884	
4.	Sd as pct of mean			5.3%	5.3%	5.3%	
<b>Transmission O&amp;M Expenses(With Uncertainty)</b>							
5.	Transmission G&A	13,700	18,700	21,100	22,200	23,800	
6.	Transmission Marketing and Scheduling	13,500	17,700	15,500	15,246	15,703	
7.	Transmission System Operations	27,300	29,200	31,100	30,996	32,106	
8.	Transmission System Maintenance	64,100	67,300	69,100	71,300	73,400	
9.	Transmission System Development	11,500	17,700	19,400	23,739	23,939	
10.	Support Services	10,000	12,700	12,500	11,890	12,246	
11.	Environment	5,400	5,000	5,000	5,100	5,300	
12.	<b>Trans Exp excl Corp,BBL &amp; CSRS</b>	145,500	168,300	173,700	180,471	186,494	
13.	TBL Corp & Shared Serv. Expenses (Determ.)	31,000	36,000	34,300	31,998	30,098	
14.	TBL Corp & Shared Serv Expense (With Uncert.)				1,998	1,998	
15.	Discrete Value x1				-1,281	-1,281	
16.	x2				359	359	
17.	x3				3,637	3,637	
18.	x4				8,555	8,555	
19.	Probability p1				0.1	0.1	
20.	p2				0.5	0.5	
21.	p3				0.3	0.3	
22.	p4				0.1	0.1	
23.	Between Business Line Expenses	39,500	37,900	38,900	84,277	84,244	

**TABLE 9.9: Network Transmission Revenue Risk**

	Operating Revenues (\$1,000)	(Actuals) FY 1999	(Transition)		(Rate Period)	
			FY 2000	FY 2001	FY 2002	FY 2003
<b>Firm</b>						
1. LT Firm			300,941	307,056		
2. ST Firm			25,000	25,000		
3. Network Firm Revenue (Deterministic)	320,055		325,941	332,056	386,100	387,649
4. Network Firm Rev (With Uncertainty)				332,056	386,100	387,649
5. Standard Deviation				4,981	5,792	5,815
6. Sd as pct of mean				1.5%	1.5%	1.5%
<b>Nonfirm</b>						
7. RNF Short Term (1 to 30 days)	0		0	0	0	0
8. ET Hourly	12,325		12,614	14,000	14,591	14,651
9. Network Hourly Nonfirm (Deterministic)	12,325		12,614	14,000	14,591	14,651
10. Network Hourly Nonfirm (With Uncertainty)				14,000	14,591	14,651
11. Standard Deviation				2,940	3,064	3,077
12. Sd as pct of mean				21%	21%	21%
13. <b>Network Grand Total</b>	332,380		338,555	346,055	400,691	402,300

**TABLE 9.10: Intertie Transmission Revenue Risk**

Operating Revenues (\$1,000)	(Actuals) FY 1999	(Transition)		(Rate Period)	
		FY 2000	FY 2001	FY 2002	FY 2003
<b>IS Firm Revenue</b>					
1. IS Long Term		45,537	45,537		
2. IS Short Term		8,968	8,968		
3. IS Assured Delivery (Pre 10/1/96)		7,419	7,419		
4. IS Firm Revenue (Deterministic)	60,745	61,924	63,000	65,676	63,373
5. IS Firm Revenue (With Uncertainty)			65,839	64,221	62,748
6. Standard Deviation			4,467	4,656	4,493
7. Sd as pct of mean			7.1%	7.1%	7.1%
8. min			62,000	50,000	50,000
9. max			74,000	70,000	70,000
<b>IS Hourly Nonfirm Revenue</b>					
10. IS Short Term	0	0	0	0	0
11. IS Hourly Nonfirm Revenue	3,904	4,000	5,200	4,513	4,355
12. IS Hourly NonFirm Revenue (Deterministic)	3,904	4,000	5,200	4,513	4,355
13. IS Hourly NonFirm Revenue (With Uncertainty)			5,200	4,513	4,355
14. Standard Deviation			1,347	1,169	1,128
15. Sd as pct of mean			26%	26%	26%

**TABLE 9.11: Ancillary Services Revenue Risk**

Operating Revenues (\$1,000)	(Actuals) FY 1999	(Transition)		(Rate Period)	
		FY 2000	FY 2001	FY 2002	FY 2003
1. Scheduling, System Control, & Dispatch				61,833	62,364
2. Sch, Sys Con, & Disp (With Uncertainty)				61,833	62,364
3. Standard Deviation				927	935
4. Reactive Supply & Voltage Control from Gen.				28,561	28,585
5. Reactive Supply & Volt. Control (With				27,609	28,023
6. Min				23,706	25,727
7. Max				30,560	29,757
8. Regulation and Frequency Response Service				15,727	15,882
9. Regulation & Freq Response (With Uncertainty)				15,354	15,988
10. Min				12,607	14,294
11. Max				17,727	17,788
12. Energy Imbalance Service				0	0
13. Operating Reserve - Spinning Reserve				19,022	19,040
14. Operating Reserve - Supplemental Reserve				19,010	19,028
15. Total Ancillary Services (Deterministic)	28,739	28,487	28,487	144,153	144,899
16. Total Ancillary Services (With Uncertainty)				142,828	144,443

**TABLE 9.12: Delivery Segment Revenue Risk**

Operating Revenues (\$1,000)	(Actuals) FY 1999	(Transition)		(Rate Period)	
		FY 2000	FY 2001	FY 2002	FY 2003
1. Utility	18,147	9,970	10,020	9,972	9,754
2. Utility Underrecovery	6,376	6,462	6,621	0	0
3. Industrial (UFT Method)	6,992	8,524	8,950	7,361	10,088
4. Delivery Segment Revenue (Deterministic)	31,515	24,956	25,591	17,333	19,842
5. Delivery Segment Revenue (With Uncertainty)			25,591	17,333	19,842
6. Standard Deviation			921	624	714
7. Sd as pct of mean			3.60%	3.60%	3.60%

**TABLE 9.13: Fiber & PCS Revenue Risk**

Operating Revenues (\$1,000)	(Actuals) FY 1999	(Transition)		(Rate Period)	
		FY 2000	FY 2001	FY 2002	FY 2003
<b>Fiber</b>					
1. Fiber&PCS Revenue (Deterministic)	6593	24,000	29,500	19,070	24,230
2. Fiber&PCS Revenue (With Uncertainty)			19,139	21,758	26,730
<b>3. PCS</b>	<b>2,913</b>	<b>4,000</b>	<b>4,500</b>	<b>4,070</b>	<b>4,430</b>
RiskCumul Distribution Values					
4. Min			1,425	1,425	1,425
5. Max			19,000	23,000	27,000
6. Cummulative Value	x1		11,420	14,250	18,800
7.	x2		14,020	17,140	21,600
8.	x3		15,760	18,750	23,960
9. Cummulative Probability	p1		0.05	0.05	0.05
10.	p2		0.2	0.2	0.2
11.	p3		0.8	0.8	0.8

**TABLE 9.14: Treasury Borrowing Rate Interest Expense Risk**

Bond type	Principal original	Principal outstanding	E(rate)	rate	Bonds due	issued	annual interest	Fiscal Year Interest Expense Impact		
								2001	2002	2003
1. TINT2001	213,504	213,504	7.29%	7.29%	2036	2001	15,564	7,782	15,564	15,564
2. ZAFW	9,086	9,086	6.92%	6.92%	2016	2001	629	314	629	629
3. Subtotal							8,097	16,193	16,193	
4. Subtotal Based on E(rate)							8,097	16,193	16,193	
5. Deviation in Net Interest Expense (Bonds Issued in 2001)							-	-	-	
6. TINT2002	243,185	243,185	7.08%	7.08%	2037	2002	17,217	8,609	17,217	
7. ZAFW	9,047	9,047	6.69%	6.69%	2017	2002	605	303	605	605
8. Subtotal							8,911	17,823	17,823	
9. Subtotal Based on E(rate)							8,911	17,823	17,823	
10. Deviation in Net Interest Expense (Bonds Issued in 2002)							-	-	-	
11. TINT2003	240,231	240,231	6.89%	6.89%	2038	2003	16,552	8,276		
12. ZAFW	9,274	9,274	6.50%	6.50%	2018	2003	603	301		
13. Subtotal							8,577			
14. Subtotal Based on E(Interest Rate)							8,577			
15. Deviation in Net Interest Expense (Bonds Issued in 2003)							-	-	-	
16. Total Annual Variation in Net Interest Expense for New Debt										

Uncertainty in Treasury Borrowing Rates  
 $\Delta r$        $p(\Delta r)$

17.	-2.00%	0.05
18.	-1.25%	0.1
19.	-0.75%	0.2
20.	0.00%	0.3
21.	0.75%	0.2
22.	1.25%	0.1
23.	2.00%	0.05

**TABLE 9.15: Sale of Facilities Net Proceeds Risk**

Net Proceeds Above Book Value (\$1,000)	(Actuals) FY 1999	(Transition)		(Rate Period)	
		FY 2000	FY 2001	FY 2002	FY 2003
1. Retained Net Proceeds from Sale of Facilities				11,000	
BetaSubj Distribution Parameters					
2. Most Likely Value				11,000	
3. Mean				11,000	
4. Maximum				6,500	
5. Minimum				15,500	

## **CHAPTER 10**

# **REPAYMENT STUDY INPUT FILES CURRENT STUDY FY 2002**



**The data in Computer File Form Used in  
the FY 2002 Current Repayment Study  
for Transmission**

1 INPUT CARDS ONLY  
 N1 REPAYMENT STUDY FOR TRANSMISSION INITIAL PROPOSAL 2002 RATE CASE  
 N2 OCTOBER 1, 2001 - SEPTEMBER 30, 2002 COST EVALUATION PERIOD  
 N3 REPAY 02 TB9 - TRANSMISSION  
 NO TRANSMISSION

11999	0	0	0	200220372037	
0 HISTORICAL YEAR:				1999	
HISTORICAL CUMULATIVE REVENUES:					0
HISTORICAL CUMULATIVE PURCHASE & EXCHANGE:					0
HISTORICAL CUMULATIVE IRRIGATION INVESTMENT:					0
YEAR OF THE RATE CHANGE:					2002
LAST YEAR OF REPAYMENT PERIOD:					2037

INTEREST RATES OF INTEREST INCOME

1X07277 07213 07253 07253

INTEREST RATES OF NEW DEFERRALS

1Y07520 07620 07540 07290

OPERATING YEAR FACTORS

1F75000 75000 75000 75000

PROJECTED REVENUE

22000	300169	256261	335220	335220	335220	335220	335220	2232530
22007	335220	335220	335220	335220	335220	335220	335220	2346540
22014	335220	335220	335220	335220	335220	335220	335220	2346540
22021	335220	335220	335220	335220	335220	335220	335220	2346540
22028	335220	335220	335220	335220	335220	335220	335220	2346540
22035	335220	335220	335220	335220	335220	335220	335220	2346540
22042	335220	335220	335220	335220	335220	335220	335220	2346540
22049	335220	335220	335220	335220	335220	335220	335220	2346540
	2646709	2602801	2681760	2681760	2681760	2681760	2681760	18658310 = TOTAL FOR 2

PROJECTED IRRIGATION ASSISTANCE

	NEW INVESTMENT	NEW INVESTMENT	NEW INVESTMENT	
32000	0	0	0	0
32003	0	0	0	0
32006	0	0	0	0
32009	0	0	0	0
32012	0	0	0	0
32015	0	0	0	0
32018	0	0	0	0
32021	0	0	0	0

32024	0	0	0	0	0	0	0
32027	0	0	0	0	0	0	0
32030	0	0	0	0	0	0	0
32033	0	0	0	0	0	0	0
32036	0	0	0	0	0	0	0
32039	0	0	0	0	0	0	0
32042	0	0	0	0	0	0	0
32045	0	0	0	0	0	0	0
32048	0	0	0	0	0	0	0
	0	0	0	0	0	0	0 = TOTAL FOR 3

CAPITALIZED CONTRACTUAL OBLIGATIONS

42000	0	0	0	-1009	-1041	-1073	-1104	-4227
42007	-1134	-1164	-1193	-1221	-1249	-1277	-1303	-8541
42014	-1329	-1355	-1380	-1404	-1428	-1451	-1474	-9821
42021	-1496	-1517	-1538	-1557	-1576	-1594	-1613	-10891
42028	-1629	-1644	-1659	-1674	-1685	-1696	-1706	-11693
42035	-1715	-1721	-1727	-1732	-1732	-1728	-1724	-12079
42042	-1718	-1716	-1714	-1712	-1714			-8574
	-9021	-9117	-9211	-10309	-10425	-8819	-8924	-65826 = TOTAL FOR 4

5	ALBE	ALBENI FALLS
5	BOIS	BOISE
5	BON2	BONNEVILLE - 2ND POWER HOUSE
5	BONN	BONNEVILLE
5	CHIE	CHIEF JOSEPH
5	COL3	COLUMBIA BASIN- 3RD POWER HOUSE
5	COLU	COLUMBIA BASIN
5	COUG	COUGAR
5	CRFB	COLUMBIA RIVER FISH MITIGATION
5	DETR	DETROIT-BIG CLIFF
5	DWOR	DWORSHAK
5	GREE	GREEN PETER-FOSTER
5	HILL	HILLS CREEK
5	HUNG	HUNGRY HORSE
5	ICEH	ICE HARBOR
5	JOHN	JOHN DAY
5	LIBB	LIBBY
5	LITT	LITTLE GOOSE
5	LOOK	LOOKOUT POINT-DEXTER
5	LOST	LOST CREEK
5	LOWG	LOWER GRANITE
5	LOWM	LOWER MONUMENTAL
5	LSFW	LOWER SNAKE F AND W
5	MCNA	MCNARY
5	MINI	MINIDOKA
5	STRU	STRUBE
5	THED	THE DALLES

5 YAKC YAKIMA-CHANDLER  
 5 YAKR YAKIMA-ROZA  
 5 ZABF BPA PROGRAM  
 5 ZADB BUREAU DIRECT FUND  
 5 ZAFW FISH, WILDLIFE & ENVIRONMENTAL  
 5 ZBPA BONNEVILLE POWER ADMINISTRATION

HISTORICAL  
O & M INTEREST

5 ALBEX	0	0	0
5 BOISX	0	0	0
5 BONNX	0	0	0
5 CHIEX	0	0	0
5 COLUX	0	0	0
5 COUGX	0	0	0
5 DETRX	0	0	0
5 DWORX	0	0	0
5 GREEX	0	0	0
5 HILLX	0	0	0
5 HUNGX	0	0	0
5 ICEHX	0	0	0
5 JOHNX	0	0	0
5 LIBBX	0	0	0
5 LITTX	0	0	0
5 LOOKX	0	0	0
5 LOSTX	0	0	0
5 LOWGX	0	0	0
5 LOWMX	0	0	0
5 MCNAX	0	0	0
5 MINIX	0	0	0
5 THEDX	0	0	0
5 YAKCX	0	0	0
5 YAKRX	0	0	0
5 ZBPAX	0	0	0
5 ZACOX	0	0	0
	0	0	0 = TOTAL FOR 5

PROJECTED O & M

0	0 = TOTAL FOR 6
---	-----------------

61994ZABF

0  
0

0 = TOTAL FOR 6

## HISTORICAL FEDERAL INVESTMENTS

		ORIGINAL PROJECT	CURRENT PRINCIPAL	INTEREST RATE	DEU DATE	INSERVICE DATE	CALENDAR MONTH
6	1996	ZBPA X	6812	0 .02500	1985	1940	
6	1996	ZBPA X	18906	0 .02500	1986	1941	
6	1996	ZBPA X	461	0 .02500	1986 R	1941	
6	1996	ZBPA X	8446	0 .02500	1987	1942	
6	1996	ZBPA X	1052	0 .02500	1987 R	1942	
6	1996	ZBPA X	16083	0 .02500	1988	1943	
6	1996	ZBPA X	4538	0 .02500	1988 R	1943	
6	1996	ZBPA X	583	0 .02500	1989	1944	
6	1996	ZBPA X	249	0 .02500	1989 R	1944	
6	1996	ZBPA X	1306	0 .02500	1990	1945	
6	1996	ZBPA X	3366	0 .02500	1990 R	1945	
6	1996	ZBPA X	2488	0 .02500	1991	1946	
6	1996	ZBPA X	732	0 .02500	1991 R	1946	
6	1996	ZBPA X	1330	0 .02500	1992	1947	
6	1996	ZBPA X	1773	0 .02500	1992 R	1947	
6	1996	ZBPA X	7468	0 .02500	1993	1948	
6	1996	ZBPA X	2290	0 .02500	1993 R	1948	
6	1996	ZBPA X	6809	0 .02500	1994	1949	
6	1996	ZBPA X	2719	0 .02500	1994 R	1949	
6	1996	ZBPA X	24111	0 .02500	1995	1950	
6	1996	ZBPA X	6124	0 .02500	1995 R	1950	
6	1996	ZBPA X	7040	0 .02500	1996	1951	
6	1996	ZBPA X	13266	0 .02500	1996 R	1951	
6	1996	ZBPA X	18610	0 .02500	1997	1952	
6	1996	ZBPA X	8979	0 .02500	1997 R	1952	
6	1996	ZBPA X	32262	0 .06330	1998	1953	
6	1996	ZBPA X	15899	0 .06330	1998 R	1953	
6	1996	ZBPA X	23614	0 .06510	1999	1954	
6	1996	ZBPA X	17370	0 .06510	1999 R	1954	
6	1996	ZBPA X	11827	11827 .06620	2000	1955	
6	1996	ZBPA X	10283	10283 .06620	2000 R	1955	
6	1996	ZBPA X	14573	14573 .06710	2001	1956	
6	1996	ZBPA X	32221	32221 .06710	2001 R	1956	
6	1996	ZBPA X	7933	7933 .06790	2002	1957	
6	1996	ZBPA X	15980	15980 .06790	2002 R	1957	
6	1996	ZBPA X	15593	15593 .06840	2003	1958	
6	1996	ZBPA X	10654	10654 .06840	2003 R	1958	
6	1996	ZBPA X	8157	8157 .06880	2004	1959	
6	1996	ZBPA X	8863	8863 .06880	2004 R	1959	
6	1996	ZBPA X	3598	3598 .06910	2005	1960	
6	1996	ZBPA X	4218	4218 .06910	2005 R	1960	
6	1996	ZBPA X	4468	4468 .06950	2006	1961	
6	1996	ZBPA X	11271	11271 .06950	2006 R	1961	
6	1996	ZBPA X	19597	19597 .06980	2007	1962	
6	1996	ZBPA X	4877	4877 .06980	2007 R	1962	

6	1996	ZBPA X	4876	4876	.07020	2008	1963
6	1996	ZBPA X	4330	4330	.07020	2008 R	1963
6	1996	ZBPA X	904	904	.07020	2008	1963
6	1996	ZBPA X	803	803	.07020	2008 R	1963
6	1996	ZBPA X	4151	4151	.07060	2009	1964
6	1996	ZBPA X	5738	5738	.07060	2009 R	1964
6	1996	ZBPA X	3706	3706	.07090	2010	1965
6	1996	ZBPA X	7248	7248	.07090	2010 R	1965
6	1996	ZBPA X	5202	5202	.07090	2010	1965
6	1996	ZBPA X	10171	10171	.07090	2010 R	1965
6	1996	ZBPA X	11830	11830	.07130	2011	1966
6	1996	ZBPA X	3049	3049	.07130	2011 R	1966
6	1996	ZBPA X	6647	6647	.07130	2011	1966
6	1996	ZBPA X	1714	1714	.07130	2011 R	1966
6	1996	ZBPA X	19003	19003	.07160	2012	1967
6	1996	ZBPA X	4566	4566	.07160	2012 R	1967
6	1996	ZBPA X	14300	14300	.07160	2012	1967
6	1996	ZBPA X	3436	3436	.07160	2012 R	1967
6	1996	ZBPA X	41070	41070	.07200	2013	1968
6	1996	ZBPA X	8076	8076	.07200	2013 R	1968
6	1996	ZBPA X	23202	23202	.07200	2013	1968
6	1996	ZBPA X	4562	4562	.07200	2013 R	1968
6	1996	ZBPA X	42237	42237	.07230	2014	1969
6	1996	ZBPA X	22537	22537	.07230	2014 R	1969
6	1996	ZBPA X	384	384	.07230	2014	1969
6	1996	ZBPA X	205	205	.07230	2014 R	1969
6	1996	ZBPA X	64977	64977	.07270	2015	1970
6	1996	ZBPA X	7995	7995	.07270	2015 R	1970
6	1996	ZBPA X	24412	24412	.07270	2015	1970
6	1996	ZBPA X	3003	3003	.07270	2015 R	1970
6	1996	ZBPA X	12025	12025	.07290	2016	1971
6	1996	ZBPA X	17766	17766	.07290	2016 R	1971
6	1996	ZBPA X	12149	12051	.07290	2016	1971
6	1996	ZBPA X	17949	17805	.07290	2016 R	1971
6	1996	ZBPA X	29326	29326	.07290	2017	1972
6	1996	ZBPA X	21170	21170	.07290	2017 R	1972
6	1996	ZBPA X	3980	3980	.07290	2017	1972
6	1996	ZBPA X	2873	2873	.07290	2017 R	1972
6	1996	ZBPA X	40207	33788	.07280	2018	1973
6	1996	ZBPA X	25770	21656	.07280	2018 R	1973
6	1996	ZBPA X	24826	16368	.07280	2018	1973
6	1996	ZBPA X	15912	10491	.07280	2018 R	1973
6	1996	ZBPA X	12079	12079	.07270	2019	1974
6	1996	ZBPA X	20984	20984	.07270	2019 R	1974
6	1996	ZBPA X	12563	12563	.07270	2019	1974
6	1996	ZBPA X	21826	21826	.07270	2019 R	1974
6	1996	ZBPA X	32026	32026	.07250	2020	1975
6	1996	ZBPA X	21916	21916	.07250	2020 R	1975
6	1996	ZBPA X	17158	17158	.07250	2020	1975
6	1996	ZBPA X	11742	11742	.07250	2020 R	1975
6	1996	ZBPA X	61025	61025	.07230	2021	1976

6	1996	ZBPA X	2212	2212	.07230	2021	R	1976
6	1996	ZBPA X	3948	3948	.07210	2022		1977
6	1996	ZBPA X	5380	5380	.07210	2022	R	1977
6	1996	ZBPA X	33702	33702	.07210	2022		1977
6	1996	ZBPA X	51049	4981	.07210	2022	R	1977
			1324696	999288				
				60.08800		198126		325408 = TOTAL FOR 6
					202671			

6	1995	ZABF X	17770	0	.08950	2013		1978 09
6	1995	ZABF X	24222	0	.08950	2013	R	1978 09
6	1998	ZABF X	3389	0	.08950	2013		1978 09
6	1998	ZABF X	4619	0	.08950	2013	R	1978 09
6	1995	ZABF X	7010	0	.09450	2014		1979 06
6	1995	ZABF X	9804	0	.09450	2014	R	1979 06
6	1995	ZABF X	26690	0	.09450	2014		1979 06
6	1995	ZABF X	21977	0	.09450	2014	R	1979 06
6	1995	ZABF X	6026	0	.09450	2014	R	1979 06
6	1995	ZABF X	21228	0	.09900	2014		1979 09
6	1995	ZABF X	14340	0	.09900	2014	R	1979 09
6	1995	ZABF X	10610	0	.09900	2014		1979 09
6	1995	ZABF X	2888	0	.09900	2014	R	1979 09
6	1998	ZABF X	1371	0	.09450	2014		1979 06
6	1998	ZABF X	1870	0	.09450	2014	R	1979 06
6	1998	ZABF X	150	0	.09450	2014		1979 06
6	1998	ZABF X	102	0	.09450	2014	R	1979 06
6	1998	ZABF X	98	0	.09900	2014		1979 09
6	1998	ZABF X	66	0	.09900	2014	R	1979 09
6	1998	ZABF X	605	0	.09900	2014		1979 09
6	1998	ZABF X	165	0	.09900	2014	R	1979 09
6	1995	ZABF X	39696	0	.13000	2015		1980 09
6	1995	ZABF X	10806	0	.13000	2015	R	1980 09
6	1995	ZABF X	44811	0	.13000	2015		1980 09
6	1995	ZABF X	1469	0	.13000	2015	R	1980 09
6	1995	ZABF X	9292	0	.13000	2015		1980 09
6	1995	ZABF X	4253	0	.13000	2015	R	1980 09
6	1998	ZABF X	2263	0	.13000	2015		1980 09
6	1998	ZABF X	616	0	.13000	2015	R	1980 09
6	1998	ZABF X	1707	0	.13000	2015		1980 09
6	1998	ZABF X	56	0	.13000	2015	R	1980 09
6	1998	ZABF X	21	0	.13000	2015		1980 09
6	1998	ZABF X	10	0	.13000	2015	R	1980 09
6	1995	ZABF X	119775	0	.16600	2016		1981 09
6	1995	ZABF X	54821	0	.16600	2016	R	1981 09
6	1998	ZABF X	277	0	.16600	2016		1981 09
6	1998	ZABF X	127	0	.16600	2016	R	1981 09
6	1995	ZABF X	34221	0	.14400	2017		1982 12
6	1995	ZABF X	15663	0	.14400	2017	R	1982 12
6	1995	ZABF X	9975	0	.14400	2017		1982 04
6	1995	ZABF X	4566	0	.14400	2017	R	1982 04

6	1995	ZABF X	46980	0	.14400	2017	1982	04
6	1995	ZABF X	37455	0	.14400	2017 R	1982	04
6	1995	ZABF X	3677	0	.14150	2017	1982	07
6	1995	ZABF X	-3677	0	.14150	2017	1987	07
6	1995	ZABF X	2932	0	.14150	2017 R	1982	07
6	1995	ZABF X	-2932	0	.14150	2017 R	1987	07
6	1995	ZABF X	77807	0	.14150	2017	1982	07
6	1995	ZABF X	-77807	0	.14150	2017	1987	07
6	1998	ZABF X	80	0	.14400	2017	1982	12
6	1998	ZABF X	36	0	.14400	2017 R	1982	12
6	1998	ZABF X	23	0	.14400	2017	1982	04
6	1998	ZABF X	11	0	.14400	2017 R	1982	04
6	1998	ZABF X	551	0	.14400	2017	1982	04
6	1998	ZABF X	439	0	.14400	2017 R	1982	04
6	1998	ZABF X	43	0	.14150	2017	1982	07
6	1998	ZABF X	-43	0	.14150	2017	1987	07
6	1998	ZABF X	34	0	.14150	2017 R	1982	07
6	1998	ZABF X	-34	0	.14150	2017 R	1987	07
6	1998	ZABF X	402	0	.14150	2017	1982	07
6	1998	ZABF X	-402	0	.14150	2017	1987	07
6	1998	ZABF X	105	0	.14150	2017 R	1982	07
6	1998	ZABF X	-105	0	.14150	2017 R	1987	07
6	1995	ZABF X	39741	0	.10850	2018	1983	11
6	1995	ZABF X	-39741	0	.10850	2018	1988	02
6	1995	ZABF X	29806	0	.11700	2018	1983	06
6	1995	ZABF X	814	0	.12250	2018	1983	09
6	1995	ZABF X	37235	0	.12250	2018	1983	09
6	1995	ZABF X	6708	0	.12250	2018 R	1983	09
6	1998	ZABF X	205	0	.10850	2018	1983	11
6	1998	ZABF X	-205	0	.10850	2018	1988	02
6	1998	ZABF X	54	0	.10850	2018 R	1983	11
6	1998	ZABF X	-54	0	.10850	2018 R	1988	02
6	1998	ZABF X	154	0	.11700	2018	1983	06 T
6	1998	ZABF X	40	0	.11700	2018 R	1983	06 T
6	1998	ZABF X	4	0	.12250	2018	1983	09
6	1998	ZABF X	1	0	.12250	2018 R	1983	09
6	1998	ZABF X	203	0	.12250	2018	1983	09
6	1998	ZABF X	35	0	.12250	2018 R	1983	09
6	1995	ZABF X	25283	0	.12300	2019	1984	11
6	1995	ZABF X	4555	0	.12300	2019 R	1984	11
6	1995	ZABF X	50567	0	.13050	2019	1984	09
6	1995	ZABF X	9109	0	.13050	2019 R	1984	09
6	1998	ZABF X	138	0	.12300	2019	1984	11
6	1998	ZABF X	24	0	.12300	2019 R	1984	11
6	1998	ZABF X	276	0	.13050	2019	1984	09
6	1998	ZABF X	48	0	.13050	2019 R	1984	09
6	1995	ZABF X	84278	0	.11250	2029	1985	06
6	1995	ZABF X	15182	0	.11250	2029 R	1985	06
6	1998	ZABF X	460	0	.11250	2029	1985	06
6	1998	ZABF X	80	0	.11250	2029 R	1985	06
6	1995	ZABF X	870	0	.08150	1996	1986	03 T

6	1995	ZABF X	157	0	.08150	1996 R	1986	03	T
6	1995	ZABF X	30161	0	.08150	1996	1986	03	T
6	1995	ZABF X	68194	0	.08150	1996 R	1986	03	T
6	1995	ZABF X	5161	0	.08950	2030	1986	06	
6	1995	ZABF X	-5161	0	.08950	2030	1992	08	
6	1995	ZABF X	11668	0	.08950	2030 R	1986	06	
6	1995	ZABF X	-11668	0	.08950	2030 R	1992	08	
6	1995	ZABF X	180054	0	.08950	2030	1986	06	
6	1995	ZABF X	-180054	0	.08950	2030	1992	08	
6	1995	ZABF X	3117	0	.08950	2030 R	1986	06	
6	1995	ZABF X	-3117	0	.08950	2030 R	1992	08	
6	1995	ZABF X	40000	0	.08950	2030 R	1986	06	
6	1995	ZABF X	-40000	0	.08950	2030 R	1994	05	
6	1995	ZABF X	57354	0	.08950	2030 R	1986	06	
6	1998	ZABF X	5	0	.08150	1996	1986	03	T
6	1998	ZABF X	1	0	.08150	1996 R	1986	03	T
6	1998	ZABF X	443	0	.08150	1996	1986	03	T
6	1998	ZABF X	169	0	.08150	1996 R	1986	03	T
6	1998	ZABF X	76	0	.08950	2030	1986	06	
6	1998	ZABF X	29	0	.08950	2030 R	1986	06	
6	1998	ZABF X	1819	0	.08950	2030	1986	06	
6	1998	ZABF X	722	0	.08950	2030 R	1986	06	
6	1995	ZABF X	43236	0	.09300	2031	1987	04	
6	1995	ZABF X	-43236	0	.09300	2031	1992	04	
6	1995	ZABF X	54409	0	.09300	2031 R	1987	04	
6	1995	ZABF X	-54409	0	.09300	2031 R	1992	04	
6	1995	ZABF X	96519	0	.08350	1992	1987	06	T
6	1995	ZABF X	4113	0	.09550	2017	1987	07	
6	1995	ZABF X	3274	0	.09550	2017 R	1987	07	
6	1995	ZABF X	86958	0	.09550	2017	1987	07	
6	1995	ZABF X	7903	0	.09550	2032	1987	07	
6	1995	ZABF X	3109	0	.09550	2032 R	1987	07	
6	1995	ZABF X	37342	0	.09550	2032	1987	07	
6	1998	ZABF X	111	0	.09300	2031	1987	04	
6	1998	ZABF X	-111	0	.09300	2031	1992	04	
6	1998	ZABF X	281	0	.09300	2031	1987	04	
6	1998	ZABF X	-281	0	.09300	2031	1992	04	
6	1998	ZABF X	554	0	.09300	2031	1987	04	
6	1998	ZABF X	-554	0	.09300	2031	1992	04	
6	1998	ZABF X	1409	0	.09300	2031	1987	04	
6	1998	ZABF X	-1409	0	.09300	2031	1992	04	
6	1998	ZABF X	2498	0	.08350	1992	1987	06	T
6	1998	ZABF X	983	0	.08350	1992 R	1987	06	T
6	1998	ZABF X	48	0	.09550	2017	1987	07	
6	1998	ZABF X	38	0	.09550	2017 R	1987	07	
6	1998	ZABF X	569	0	.09550	2017	1987	07	
6	1998	ZABF X	285	0	.09550	2032	1987	07	
6	1998	ZABF X	112	0	.09550	2032 R	1987	07	
6	1998	ZABF X	631	0	.09550	2032	1987	07	
6	1998	ZABF X	618	0	.09550	2032 R	1987	07	
6	1995	ZABF X	43417	0	.09500	2018	1988	02	

6	1995	ZABF X	28513	0	.09500	2033	1988	02
6	1995	ZABF X	-28513	0	.09500	2033	1994	10
6	1995	ZABF X	27887	0	.09500	2033 R	1988	02
6	1995	ZABF X	-27887	0	.09500	2033 R	1994	10
6	1995	ZABF X	20677	0	.09500	2033	1988	02
6	1995	ZABF X	-20677	0	.09500	2033	1994	10
6	1995	ZABF X	22923	0	.09500	2033 R	1988	02
6	1995	ZABF X	-22923	0	.09500	2033 R	1994	10
6	1995	ZABF X	45870	0	.09500	2033 R	1988	02
6	1995	ZABF X	-45870	0	.09500	2033 R	1994	05
6	1995	ZABF X	9018	0	.09900	2033	1988	06
6	1995	ZABF X	30004	0	.09900	2033 R	1988	06
6	1998	ZABF X	618	0	.09550	2032 R	1987	07
6	1998	ZABF X	283	0	.09500	2018	1988	02
6	1998	ZABF X	954	0	.09500	2033	1988	02
6	1998	ZABF X	-954	0	.09500	2033	1994	05
6	1998	ZABF X	933	0	.09500	2033 R	1988	02
6	1998	ZABF X	-933	0	.09500	2033 R	1994	05
6	1998	ZABF X	518	0	.09500	2033	1988	02
6	1998	ZABF X	-518	0	.09500	2033	1994	05
6	1998	ZABF X	1725	0	.09500	2033 R	1988	02
6	1998	ZABF X	-1725	0	.09500	2033 R	1994	05
6	1998	ZABF X	226	0	.09900	2033	1988	06
6	1998	ZABF X	752	0	.09900	2033 R	1988	06
6	1995	ZABF X	16909	0	.08950	1999	1989	05 T
6	1995	ZABF X	56257	0	.08950	1999 R	1989	05 T
6	1998	ZABF X	424	0	.08950	1999	1989	05 T
6	1998	ZABF X	1410	0	.08950	1999 R	1989	05 T
6	1995	ZABF X	1149	1149	.09250	2030	1990	01 10
6	1995	ZABF X	3824	3824	.09250	2030 R	1990	01 10
6	1995	ZABF X	41894	41894	.09250	2030	1990	01 10
6	1998	ZABF X	29	29	.09250	2030	1990	01 10
6	1998	ZABF X	96	96	.09250	2030 R	1990	01 10
6	1998	ZABF X	3008	3008	.09250	2030	1990	01 10
6	1995	ZABF X	54145	0	.07550	1995	1991	02 T
6	1998	ZABF X	5855	0	.07550	1995	1991	02 T
6	1995	ZABF X	147521	0	.08800	2032	1992	04
6	1995	ZABF X	50000	0	.07000	1997	1992	04 T
6	1995	ZABF X	80000	0	.06200	1995	1992	04 T
6	1995	ZABF X	28300	0	.07000	1997	1992	04 T
6	1995	ZABF X	150000	0	.08130	2032	1992	07
6	1995	ZABF X	-103000	0	.08130	2032	1997	07
6	1995	ZABF X	-70300	0	.08130	2032	1998	04
6	1995	ZABF X	-67900	0	.08130	2032	1998	05
6	1995	ZABF X	107800	92125	.06600	2000	1992	08 T
6	1995	ZABF X	107700	0	.07250	2007	1992	08
6	1995	ZABF X	-107700	0	.07250	2007	1998	08
6	1995	ZABF X	50000	0	.06050	1997	1992	10 T
6	1995	ZABF X	99962	0	.08350	2032	1992	10
6	1998	ZABF X	2479	0	.08800	2032	1992	04
6	1995	ZABF X	50000	50000	.06850	2034	1994	10

6	1995	ZABF X	130000	0	.07800	2033	1993	02	
6	1995	ZABF X	-130000	0	.07800	2033	1998	05	
6	1995	ZABF X	100000	0	.07500	2033	1993	04	
6	1995	ZABF X	-100000	0	.07500	2033	1998	08	
6	1995	ZABF X	110000	110000	.06950	2033	1993	08	
6	1995	ZABF X	108400	108400	.06850	2034	1994	10	
6	1995	ZABF X	43155	0	.07100	1998	1994	05	01 P
6	1995	ZABF X	49489	0	.07100	1998	1994	05	01 P
6	1995	ZABF X	50000	50000	.07050	2034	1994	01	
6	1995	ZABF X	50000	0	.08200	2034	1994	05	
6	1995	ZABF X	55000	0	.07650	1999	1994	09	01 P
6	1995	ZABF X	55000	0	.08350	2001	1995	01	01 P
6	1995	ZABF X	41491	41491	.07700	2025	1995	07	05
6	1995	ZABF X	65000	65000	.07700	2025	1995	08	05
6	1995	ZAFW X	12100	12100	.07200	2010	1995	08	05
6	1998	ZABF X	8442	8442	.07700	2025	1995	07	05
6	1996	ZABF X	50000	50000	.05900	2003	1996	01	
6	1996	ZABF X	70000	70000	.07050	2006	1996	08	T
6	1997	ZAFW X	40000	40000	.06950	2012	1997	11	05
6	1998	ZABF X	4378	4378	.05900	2003	1996	08	T
6	1997	ZABF X	30000	30000	.06800	2004	1997	01	T
6	1997	ZABF X	80000	80000	.06900	2005	1997	05	T
6	1997	ZABF X	111254	111254	.06650	2007	1997	08	T
6	1998	ZABF X	75300	75300	.06000	2008	1998	04	T
6	1998	ZABF X	50000	50000	.06650	2028	1998	04	10
6	1998	ZABF X	72700	72700	.06000	2009	1998	05	T
6	1998	ZABF X	40000	40000	.06200	2011	1998	05	T
6	1998	ZABF X	98900	98900	.06700	2032	1998	05	10
6	1998	ZABF X	106600	106600	.05850	2023	1998	08	T
6	1998	ZABF X	112400	112400	.05850	2028	1998	08	T
6	1998	ZABF X	40000	40000	.05750	2008	1998	08	T
6	1999	ZABF X	60000	60000	.05900	2014	1999	02	T
6	1999	ZABF X	26200	26200	.05950	2004	1999	05	T
6	1999	ZABF X	40000	40000	.06200	2002	1999	09	T
			3834999	1695300					2139699 = TOTAL FOR 6
				176.72200		30144			
				460397					

PROJECTED FEDERAL INVESTMENTS

PROJECT	ORIGINAL PRINCIPAL	CURRENT PRINCIPAL	INTEREST RATE	DUE DATE	INSERVICE CALENDAR	
					DATE	MONTH
6 2000	ZABF X	40000	40000	.06400	2003	2000 11 T
6 2000	ZABF X	189593	189593	.07540	2035	2000 03
6 2000	ZABF X	15323	15323	.07540	2031	2000 03
6 2000	ZAFW X	19603	19603	.07240	2015	2000 03
6 2001	ZABF X	201604	201604	.07290	2036	2001 03

6	2001	ZAFW X	9086	9086	.06920	2016	2001	03
6	2002	ZABF X	233185	233185	.07080	2037	2002	03
6	2002	ZAFW X	9047	9047	.06690	2017	2002	03
			717441	717441				
				56.7000		16006		
					16190			
							0 = TOTAL FOR 6	

## **CHAPTER 11**

### **REPAYMENT STUDY RESULTS CURRENT STUDY FY 2002**



**Summary of Interest Expense  
Transmission  
FY 2002 Current Repayment Study**

## SUMMARY OF INTEREST EXPENSE

## TRANSMISSION FY 2002

## REPAYMENT STUDY FOR TRANSMISSION INITIAL PROPOSAL 2002 RA

(ALL AMOUNTS IN \$1000)

2000      2001      2002      2003      2004      2005      2006      2007      2008      2009

## BUREAU OF RECLAMATION

BOISE  
 COLUMBIA BASIN  
 COLUMBIA BASIN- 3RD  
 HUNGRY HORSE  
 MINIDOKA  
 YAKIMA-CHANDLER  
 YAKIMA-ROZA

## TOTAL BUREAU

## CORPS OF ENGINEERS

ALBENI FALLS  
 BONNEVILLE  
 BONNEVILLE - 2ND POW  
 CHIEF JOSEPH  
 COUGAR  
 COLUMBIA RIVER FISH  
 DETROIT-BIG CLIFF  
 DWORSHAK  
 GREEN PETER-FOSTER  
 HILLS CREEK  
 ICE HARBOR  
 JOHN DAY  
 LIBBY  
 LITTLE GOOSE  
 LOOKOUT POINT-DEXTER  
 LOST CREEK  
 LOWER GRANITE  
 LOWER MONUMENTAL  
 MCNARY  
 STRUBE  
 THE DALLES

## TOTAL CORPS

## LOWER SNAKE F AND W

BONNEVILLE POWER ADM	71,508	70,044	66,904	65,280	63,484	59,460	58,920	57,826	56,118	55,353
TOTAL APPROPRIATIONS	71,508	70,044	66,904	65,280	63,484	59,460	58,920	57,826	56,118	55,353

## BPA BORROWING

BPA PROGRAM	118,536	127,923	142,392	145,739	147,072	150,173	149,880	150,180	151,716	153,328
BUREAU DIRECT FUND										
FISH, WILDLIFE & ENV	4,361	5,384	6,002	6,304	6,304	6,304	6,304	6,304	6,304	6,304
PREMIUMS	24	822	5,185	1,686	2,061	3,990	4,038	1,110	1,605	1,786
LESS										
AFUDC										
INTEREST INCOME	8,847	6,976	10,453	10,311	10,289	10,235	10,242	10,239	10,213	10,186
TOTAL BPA BORROWING	114,074	127,153	143,126	143,418	145,148	150,232	149,980	147,355	149,412	151,232
TOTALS	185,582	197,197	210,030	208,698	208,632	209,692	208,900	205,181	205,530	206,585

## SUMMARY OF INTEREST EXPENSE

## TRANSMISSION FY 2002

## REPAYMENT STUDY FOR TRANSMISSION INITIAL PROPOSAL 2002 RA

(ALL AMOUNTS IN \$1000)

2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
------	------	------	------	------	------	------	------	------	------

## BUREAU OF RECLAMATION

BOISE  
 COLUMBIA BASIN  
 COLUMBIA BASIN- 3RD  
 HUNGRY HORSE  
 MINIDOKA  
 YAKIMA-CHANDLER  
 YAKIMA-ROZA

## TOTAL BUREAU

## CORPS OF ENGINEERS

ALBENI FALLS  
 BONNEVILLE  
 BONNEVILLE - 2ND POW  
 CHIEF JOSEPH  
 COUGAR  
 COLUMBIA RIVER FISH  
 DETROIT-BIG CLIFF  
 DWORSHAK  
 GREEN PETER-FOSTER  
 HILLS CREEK  
 ICE HARBOR  
 JOHN DAY  
 LIBBY  
 LITTLE GOOSE  
 LOOKOUT POINT-DEXTER  
 LOST CREEK  
 LOWER GRANITE  
 LOWER MONUMENTAL  
 MCNARY  
 STRUBE  
 THE DALLES

## TOTAL CORPS

## LOWER SNAKE F AND W

BONNEVILLE POWER ADM	51,913	41,619	33,341	25,098	13,984	7,219			
TOTAL APPROPRIATIONS	51,913	41,619	33,341	25,098	13,984	7,219			

## BPA BORROWING

BPA PROGRAM	157,181	167,993	176,462	187,551	198,783	206,624	215,875	217,601	219,824	221,799
BUREAU DIRECT FUND										
FISH, WILDLIFE & ENV	6,304	5,433	5,433	2,653	2,653	2,653	1,234	605		
PREMIUMS						1,372	5,699	6,285	6,880	6,799
LESS										
AFUDC										
INTEREST INCOME	10,118	9,939	9,787	9,638	9,436	9,295	9,155	9,137	9,109	9,075
TOTAL BPA BORROWING	153,367	163,487	172,108	180,566	192,000	201,354	213,653	215,354	217,595	219,523
TOTALS	205,280	205,106	205,449	205,664	205,984	208,573	213,653	215,354	217,595	219,523

SUMMARY OF INTEREST EXPENSE	TRANSMISSION FY 2002	REPAYMENT STUDY FOR TRANSMISSION INITIAL PROPOSAL 2002 RA								
	(ALL AMOUNTS IN \$1000)									
	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
BUREAU OF RECLAMATION										
BOISE										
COLUMBIA BASIN										
COLUMBIA BASIN- 3RD										
HUNGRY HORSE										
MINIDOKA										
YAKIMA-CHANDLER										
YAKIMA-ROZA										
TOTAL BUREAU										
CORPS OF ENGINEERS										
ALBENI FALLS										
BONNEVILLE										
BONNEVILLE - 2ND POW										
CHIEF JOSEPH										
COUGAR										
COLUMBIA RIVER FISH										
DETROIT-BIG CLIFF										
DWORSHAK										
GREEN PETER-FOSTER										
HILLS CREEK										
ICE HARBOR										
JOHN DAY										
LIBBY										
LITTLE GOOSE										
LOOKOUT POINT-DEXTER										
LOST CREEK										
LOWER GRANITE										
LOWER MONUMENTAL										
MCNARY										
STRUBE										
THE DALLES										
TOTAL CORPS										
LOWER SNAKE F AND W										
BONNEVILLE POWER ADM										
TOTAL APPROPRIATIONS										

## BPA BORROWING

BPA PROGRAM	224,071	226,657	229,566	232,811	237,368	241,382	245,777	250,580	255,862	262,609
BUREAU DIRECT FUND										
FISH, WILDLIFE & ENV										
PREMIUMS	6,696	6,569	6,420	1,315	5,884	5,663	5,418	2,695		1,525
LESS										
AFUDC										
INTEREST INCOME	9,035	8,990	8,938	8,881	8,799	8,728	8,649	8,563	8,469	8,347
TOTAL BPA BORROWING	221,732	224,236	227,048	225,245	234,453	238,317	242,546	244,712	247,393	255,787
TOTALS	221,732	224,236	227,048	225,245	234,453	238,317	242,546	244,712	247,393	255,787

## SUMMARY OF INTEREST EXPENSE

## TRANSMISSION FY 2002

## REPAYMENT STUDY FOR TRANSMISSION INITIAL PROPOSAL 2002 RA

(ALL AMOUNTS IN \$1000)

2030      2031      2032      2033      2034      2035      2036      2037

BUREAU OF RECLAMATION

BOISE  
COLUMBIA BASIN  
COLUMBIA BASIN- 3RD  
HUNGRY HORSE  
MINIDOKA  
YAKIMA-CHANDLER  
YAKIMA-ROZA

TOTAL BUREAU

CORPS OF ENGINEERS

ALBENI FALLS  
BONNEVILLE  
BONNEVILLE - 2ND POW  
CHIEF JOSEPH  
COUGAR  
COLUMBIA RIVER FISH  
DETROIT-BIG CLIFF  
DWORSHAK  
GREEN PETER-FOSTER  
HILLS CREEK  
ICE HARBOR  
JOHN DAY  
LIBBY  
LITTLE GOOSE  
LOOKOUT POINT-DEXTER  
LOST CREEK  
LOWER GRANITE  
LOWER MONUMENTAL  
MCNARY  
STRUBE  
THE DALLES

TOTAL CORPS

LOWER SNAKE F AND W

BONNEVILLE POWER ADM

TOTAL APPROPRIATIONS

BPA BORROWING

BPA PROGRAM	268,687	275,351	282,692	290,775	299,432	308,803	318,826	329,667
BUREAU DIRECT FUND								
FISH, WILDLIFE & ENV								
PREMIUMS	707	513	205	308	174	325	189	60
LESS								
AFUDC								
INTEREST INCOME	8,238	8,119	7,986	7,841	7,685	7,516	7,335	7,139
TOTAL BPA BORROWING	261,156	267,745	274,911	283,242	291,921	301,612	311,680	322,588
TOTALS	261,156	267,745	274,911	283,242	291,921	301,612	311,680	322,588

SUMMARY OF INTEREST EXPENSE

TRANSMISSION FY 2002

REPAYMENT STUDY FOR TRANSMISSION INITIAL PROPOSAL 2002 RA

TOTALS

BUREAU OF RECLAMATION

BOISE  
COLUMBIA BASIN  
COLUMBIA BASIN- 3RD  
HUNGRY HORSE  
MINIDOKA  
YAKIMA-CHANDLER  
YAKIMA-ROZA

TOTAL BUREAU

CORPS OF ENGINEERS

ALBENI FALLS  
BONNEVILLE  
BONNEVILLE - 2ND POW  
CHIEF JOSEPH  
COUGAR  
COLUMBIA RIVER FISH  
DETROIT-BIG CLIFF  
DWORSHAK  
GREEN PETER-FOSTER  
HILLS CREEK  
ICE HARBOR  
JOHN DAY  
LIBBY  
LITTLE GOOSE  
LOOKOUT POINT-DEXTER  
LOST CREEK  
LOWER GRANITE  
LOWER MONUMENTAL  
MCNARY  
STRUBE  
THE DALLES

TOTAL CORPS

LOWER SNAKE F AND W

TOTAL APPROPRIATIONS

BONNEVILLE POWER ADM      798,071

BPA BORROWING

BPA PROGRAM	8,187,548
BUREAU DIRECT FUND	
FISH, WILDLIFE & ENV	86,843
PREMIUMS	94,008
LESS	
0 AFUDC	
0 INTEREST INCOME	341,938
0TOTAL BPA BORROWING	8,026,461
TOTALS	----- 8,824,532



**Application of Amortization  
Transmission  
FY 2002 Current Repayment Study**

	APPLICATION OF AMORTIZATION		TRANSMISSION FY 2002		REPAYMENT STUDY FOR TRANSMISSION INITIAL PROPOSAL 2002 RA			
YEAR			INVESTMENT PAID-----					
			(ALL AMOUNT IN \$1000)					
	PROJECT	IN-SERVICE	DUE	GROSS	NET	RATE	REPLACEMENT	AMOUNT
2000	BPA PROGRAM	1992	2000	92,125	92,125	.06600		92,125
	BONNEVILLE POWER ADMINISTRATION	1955	2000	11,827	11,827	.06620		11,827
	BONNEVILLE POWER ADMINISTRATION	1955	2000	10,283	10,283	.06620	R	10,283
	BPA PROGRAM	1990	2030	1,149	1,149	.09250		352
	TOTAL							114,587
2001	BONNEVILLE POWER ADMINISTRATION	1956	2001	14,573	14,573	.06710		14,573
	BONNEVILLE POWER ADMINISTRATION	1956	2001	32,221	32,221	.06710	R	32,221
	BPA PROGRAM	1990	2030	1,149	797	.09250		797
	BPA PROGRAM	1990	2030	3,824	3,824	.09250	R	3,824
	BPA PROGRAM	1990	2030	41,894	41,894	.09250		7,649
	TOTAL							59,064
2002	BONNEVILLE POWER ADMINISTRATION	1957	2002	7,933	7,933	.06790		7,933
	BPA PROGRAM	1999	2002	40,000	40,000	.06200		40,000
	BONNEVILLE POWER ADMINISTRATION	1957	2002	15,980	15,980	.06790	R	15,980
	BPA PROGRAM	1990	2030	41,894	34,245	.09250		34,245
	BPA PROGRAM	1990	2030	29	29	.09250		29
	BPA PROGRAM	1990	2030	96	96	.09250	R	96
	BPA PROGRAM	1990	2030	3,008	3,008	.09250		3,008
	BPA PROGRAM	1995	2025	41,491	41,491	.07700		41,491
	BPA PROGRAM	1995	2025	65,000	65,000	.07700		5,357
	TOTAL							148,139
2003	BPA PROGRAM	1996	2003	4,378	4,378	.05900		4,378
	BPA PROGRAM	2000	2003	40,000	40,000	.06400		40,000
	BPA PROGRAM	1996	2003	50,000	50,000	.05900		50,000
	BONNEVILLE POWER ADMINISTRATION	1958	2003	15,593	15,593	.06840		15,593
	BONNEVILLE POWER ADMINISTRATION	1958	2003	10,654	10,654	.06840	R	10,654
	BPA PROGRAM	1995	2025	65,000	59,643	.07700		29,855
	TOTAL							150,480

## APPLICATION OF AMORTIZATION

## TRANSMISSION FY 2002

## REPAYMENT STUDY FOR TRANSMISSION INITIAL PROPOSAL 2002 RA

YEAR

INVESTMENT PAID

(ALL AMOUNT IN \$1000)

	PROJECT	IN-SERVICE	DUE	GROSS	NET	RATE	REPLACEMENT	AMOUNT
2004	BPA PROGRAM	1999	2004	26,200	26,200	.05950		26,200
	BPA PROGRAM	1997	2004	30,000	30,000	.06800		30,000
	BONNEVILLE POWER ADMINISTRATION	1959	2004	8,157	8,157	.06880		8,157
	BONNEVILLE POWER ADMINISTRATION	1959	2004	8,863	8,863	.06880	R	8,863
	BPA PROGRAM	1995	2025	65,000	29,788	.07700		29,788
	BPA PROGRAM	1995	2025	8,442	8,442	.07700		8,442
	BONNEVILLE POWER ADMINISTRATION	1971	2016	17,805	17,805	.07290	R	17,805
	BONNEVILLE POWER ADMINISTRATION	1971	2016	12,051	12,051	.07290		12,051
	BONNEVILLE POWER ADMINISTRATION	1971	2016	17,766	17,766	.07290	R	9,272
	TOTAL							150,578
2005	BONNEVILLE POWER ADMINISTRATION	1960	2005	4,218	4,218	.06910	R	4,218
	BPA PROGRAM	1997	2005	80,000	80,000	.06900		80,000
	BONNEVILLE POWER ADMINISTRATION	1960	2005	3,598	3,598	.06910		3,598
	BPA PROGRAM	2000	2035	189,593	189,593	.07540		61,734
	TOTAL							149,550
2006	BPA PROGRAM	1996	2006	70,000	70,000	.07050		70,000
	BONNEVILLE POWER ADMINISTRATION	1961	2006	11,271	11,271	.06950	R	11,271
	BONNEVILLE POWER ADMINISTRATION	1961	2006	4,468	4,468	.06950		4,468
	BPA PROGRAM	2000	2035	189,593	127,859	.07540		64,634
	TOTAL							150,373
2007	BPA PROGRAM	1997	2007	111,254	111,254	.06650		111,254
	BONNEVILLE POWER ADMINISTRATION	1962	2007	4,877	4,877	.06980	R	4,877
	BONNEVILLE POWER ADMINISTRATION	1962	2007	19,597	19,597	.06980		19,597
	BPA PROGRAM	2000	2035	189,593	63,225	.07540		18,394
	TOTAL							154,122
2008	BPA PROGRAM	1998	2008	40,000	40,000	.05750		40,000
	BPA PROGRAM	1998	2008	75,300	75,300	.06000		75,300
	BONNEVILLE POWER ADMINISTRATION	1963	2008	4,330	4,330	.07020	R	4,330
	BONNEVILLE POWER ADMINISTRATION	1963	2008	4,876	4,876	.07020		4,876
	BONNEVILLE POWER ADMINISTRATION	1963	2008	803	803	.07020	R	803
	BONNEVILLE POWER ADMINISTRATION	1963	2008	904	904	.07020		904
	BPA PROGRAM	2000	2035	189,593	44,831	.07540		27,590
	TOTAL							153,803

**APPLICATION OF AMORTIZATION**      **TRANSMISSION FY 2002**      **REPAYMENT STUDY FOR TRANSMISSION INITIAL PROPOSAL 2002 RA**

TRANSMISSION FY 2002

REPAYMENT STUDY FOR TRANSMISSION INITIAL PROPOSAL 2002 RA

**YEAR**

-- INVESTMENT PAID --

( ALL AMOUNT IN \$1000 )

PROJECT	IN-SERVICE	DUEDATE	GROSS	NET	RATE	REPLACEMENT	AMOUNT
2009	BONNEVILLE POWER ADMINISTRATION	1964	2009	5,738	.07060	R	5,738
	BPA PROGRAM	1998	2009	72,700	.06000		72,700
	BONNEVILLE POWER ADMINISTRATION	1964	2009	4,151	.07060		4,151
	BPA PROGRAM	2000	2035	189,593	.07540		17,241
	BPA PROGRAM	2000	2031	15,323	.07540		15,323
	BONNEVILLE POWER ADMINISTRATION	1971	2016	17,766	.07290	R	8,494
	BONNEVILLE POWER ADMINISTRATION	1971	2016	12,025	.07290		12,025
	BONNEVILLE POWER ADMINISTRATION	1972	2017	2,873	.07290	R	2,873
	BONNEVILLE POWER ADMINISTRATION	1972	2017	3,980	.07290		3,980
	BONNEVILLE POWER ADMINISTRATION	1972	2017	21,170	.07290	R	10,252
	TOTAL						152,777
2010	FISH, WILDLIFE & ENVIRONMENTAL	1995	2010	12,100	.07200		12,100
	BONNEVILLE POWER ADMINISTRATION	1965	2010	3,706	.07090		3,706
	BONNEVILLE POWER ADMINISTRATION	1965	2010	7,248	.07090	R	7,248
	BONNEVILLE POWER ADMINISTRATION	1965	2010	5,202	.07090		5,202
	BONNEVILLE POWER ADMINISTRATION	1965	2010	10,171	.07090	R	10,171
	BONNEVILLE POWER ADMINISTRATION	1972	2017	21,170	.07290	R	10,918
	BONNEVILLE POWER ADMINISTRATION	1972	2017	29,326	.07290		29,326
	BONNEVILLE POWER ADMINISTRATION	1973	2018	10,491	.07280	R	10,491
	BONNEVILLE POWER ADMINISTRATION	1973	2018	16,368	.07280		16,368
	BONNEVILLE POWER ADMINISTRATION	1973	2018	21,656	.07280	R	21,656
	BONNEVILLE POWER ADMINISTRATION	1973	2018	33,788	.07280		26,924
	TOTAL						154,110
2011	BONNEVILLE POWER ADMINISTRATION	1966	2011	11,830	.07130		11,830
	BPA PROGRAM	1998	2011	40,000	.06200		40,000
	BONNEVILLE POWER ADMINISTRATION	1966	2011	6,647	.07130		6,647
	BONNEVILLE POWER ADMINISTRATION	1966	2011	3,049	.07130	R	3,049
	BONNEVILLE POWER ADMINISTRATION	1966	2011	1,714	.07130	R	1,714
	BONNEVILLE POWER ADMINISTRATION	1973	2018	33,788	.07280		6,864
	BONNEVILLE POWER ADMINISTRATION	1970	2015	3,003	.07270	R	3,003
	BONNEVILLE POWER ADMINISTRATION	1970	2015	24,412	.07270		24,412
	BONNEVILLE POWER ADMINISTRATION	1970	2015	7,995	.07270	R	7,995
	BONNEVILLE POWER ADMINISTRATION	1970	2015	64,977	.07270		48,798
	TOTAL						154,312



## APPLICATION OF AMORTIZATION TRANSMISSION FY 2002 REPAYMENT STUDY FOR TRANSMISSION INITIAL PROPOSAL 2002 RA

YEAR	INVESTMENT PAID						
	(ALL AMOUNT IN \$1000)						
PROJECT	IN-SERVICE	DUEDUE	GROSS	NET	RATE	REPLACEMENT	AMOUNT
2015	FISH, WILDLIFE & ENVIRONMENTAL	2000	2015	19,603	19,603	.07240	19,603
	BONNEVILLE POWER ADMINISTRATION	1976	2021	61,025	49,757	.07230	49,757
	BONNEVILLE POWER ADMINISTRATION	1976	2021	2,212	2,212	.07230	2,212
	BONNEVILLE POWER ADMINISTRATION	1977	2022	3,948	3,948	.07210	3,948
	BONNEVILLE POWER ADMINISTRATION	1977	2022	33,702	33,702	.07210	33,702
	BONNEVILLE POWER ADMINISTRATION	1977	2022	4,981	4,981	.07210	4,981
	BONNEVILLE POWER ADMINISTRATION	1977	2022	5,380	5,380	.07210	5,380
	BPA PROGRAM	2001	2036	201,604	201,604	.07290	31,368
	TOTAL						150,951
2016	FISH, WILDLIFE & ENVIRONMENTAL	2001	2016	9,086	9,086	.06920	9,086
	BPA PROGRAM	2001	2036	201,604	170,236	.07290	136,810
	TOTAL						145,896
2017	FISH, WILDLIFE & ENVIRONMENTAL	2002	2017	9,047	9,047	.06690	9,047
	BPA PROGRAM	2001	2036	201,604	33,426	.07290	33,426
	BPA PROGRAM	2003	2048	131,031	131,031	.07080	101,746
	TOTAL						144,219
2018	BPA PROGRAM	2003	2048	131,031	29,285	.07080	29,285
	BPA PROGRAM	2004	2049	134,500	134,500	.07080	112,717
	TOTAL						142,002
2019	BPA PROGRAM	2004	2049	134,500	21,783	.07080	21,783
	BPA PROGRAM	2005	2050	137,907	137,907	.07080	118,314
	TOTAL						140,097
2020	BPA PROGRAM	2005	2050	137,907	19,593	.07080	19,593
	BPA PROGRAM	2006	2051	141,220	141,220	.07080	118,318
	TOTAL						137,911
2021	BPA PROGRAM	2006	2051	141,220	22,902	.07080	22,902
	BPA PROGRAM	2007	2052	144,361	144,361	.07080	112,527
	TOTAL						135,429

	APPLICATION OF AMORTIZATION		TRANSMISSION FY 2002		REPAYMENT STUDY FOR TRANSMISSION INITIAL PROPOSAL 2002 RA									
YEAR	INVESTMENT PAID													
	(ALL AMOUNT IN \$1000)													
	PROJECT	IN-SERVICE	DUEDUE	GROSS	NET	RATE	REPLACEMENT	AMOUNT						
2022	BPA PROGRAM	2007	2052	144,361	31,834	.07080	R	31,834						
	BPA PROGRAM	2008	2053	147,185	147,185	.07080	R	100,804						
	TOTAL							132,638						
2023	BPA PROGRAM	1998	2023	106,600	106,600	.05850		106,600						
	BPA PROGRAM	2008	2053	147,185	46,381	.07080	R	27,862						
	TOTAL							134,462						
2024	BPA PROGRAM	2008	2053	147,185	18,519	.07080	R	18,519						
	BPA PROGRAM	2009	2054	149,676	149,676	.07080	R	106,754						
	TOTAL							125,273						
2025	BPA PROGRAM	2009	2054	149,676	42,922	.07080	R	42,922						
	BPA PROGRAM	2010	2055	151,745	151,745	.07080	R	78,506						
	TOTAL							121,428						
2026	BPA PROGRAM	2010	2055	151,745	73,239	.07080	R	73,239						
	BPA PROGRAM	2011	2056	153,671	153,671	.07080	R	43,978						
	TOTAL							117,217						
2027	BPA PROGRAM	2011	2056	153,671	109,693	.07080	R	49,933						
	BPA PROGRAM	2002	2037	233,185	233,185	.07080		15,107						
	BPA PROGRAM	1998	2028	50,000	50,000	.06650		50,000						
	TOTAL							115,040						
2028	BPA PROGRAM	1998	2028	112,400	112,400	.05850		112,400						
	BPA PROGRAM	2011	2056	153,671	59,760	.07080	R	5						
	TOTAL							112,405						
2029	BPA PROGRAM	2011	2056	153,671	59,755	.07080	R	12						
	BPA PROGRAM	2002	2037	233,185	218,078	.07080		82,466						
	BPA PROGRAM	1994	2034	50,000	50,000	.07050		21,548						
	TOTAL							104,026						

	APPLICATION OF AMORTIZATION		TRANSMISSION FY 2002		REPAYMENT STUDY FOR TRANSMISSION INITIAL PROPOSAL 2002 RA							
YEAR	INVESTMENT PAID											
	(ALL AMOUNT IN \$1000)											
	PROJECT	IN-SERVICE	DUE	GROSS	NET	RATE	REPLACEMENT					
2030	BPA PROGRAM	2011	2056	153,671	59,743	.07080	R					
	BPA PROGRAM	1994	2034	50,000	28,452	.07050						
	BPA PROGRAM	1993	2033	110,000	110,000	.06950						
	TOTAL						98,672					
2031	BPA PROGRAM	2011	2056	153,671	55,839	.07080	R					
	BPA PROGRAM	1993	2033	110,000	43,684	.06950						
	BPA PROGRAM	1994	2034	50,000	50,000	.06850						
	BPA PROGRAM	1998	2032	98,900	98,900	.06700						
	TOTAL						92,098					
2032	BPA PROGRAM	1998	2032	98,900	79,515	.06700						
	BPA PROGRAM	2011	2056	153,671	50,750	.07080	R					
	TOTAL						79,515					
							5,428					
							84,943					
2033	BPA PROGRAM	2011	2056	153,671	45,322	.07080	R					
	BPA PROGRAM	1994	2034	50,000	26,060	.06850						
	BPA PROGRAM	1994	2034	108,400	108,400	.06850						
	TOTAL						76,623					
2034	BPA PROGRAM	1994	2034	108,400	62,940	.06850						
	BPA PROGRAM	2011	2056	153,671	40,219	.07080	R					
	TOTAL						62,940					
							5,014					
							67,954					
2035	BPA PROGRAM	2011	2056	153,671	35,205	.07080	R					
	BPA PROGRAM	2002	2037	233,185	135,612	.07080						
	TOTAL						3,073					
							55,199					
							58,272					
2036	BPA PROGRAM	2011	2056	153,671	32,132	.07080	R					
	BPA PROGRAM	2002	2037	233,185	80,413	.07080						
	TOTAL						3,105					
							45,105					
							48,210					

	APPLICATION OF AMORTIZATION		TRANSMISSION FY 2002		REPAYMENT STUDY FOR TRANSMISSION INITIAL PROPOSAL 2002 RA			
YEAR	INVESTMENT PAID-----							
	(ALL AMOUNT IN \$1000)							
	PROJECT	IN-SERVICE	DUE	GROSS	NET	RATE	REPLACEMENT	AMOUNT
2037	BPA PROGRAM	2002	2037	233,185	35,308	.07080		35,308
	BPA PROGRAM	2011	2056	153,671	29,027	.07080	R	2,000
	TOTAL							37,308
	GRAND TOTAL							4,676,288
	TOTAL DEFERRAL							0
	NET							4,676,288



## **CHAPTER 12**

# **REPAYMENT STUDY INPUT FILES CURRENT STUDY**

**FY 2003**



**The data in Computer File Form Used in  
the FY 2003 Current Repayment Study  
for Transmission**

1 INPUT CARDS ONLY  
 N1 REPAYMENT STUDY FOR TRANSMISSION INITIAL PROPOSAL 2002 RATE CASE  
 N2 OCTOBER 1, 2002 - SEPTEMBER 30, 2003 COST EVALUATION PERIOD  
 N3 REPAY 03 TB9 - TRANSMISSION  
 NO TRANSMISSION

11999	0	0	0	200320382038
0 HISTORICAL YEAR:				1999
HISTORICAL CUMULATIVE REVENUES:				0
HISTORICAL CUMULATIVE PURCHASE & EXCHANGE:				0
HISTORICAL CUMULATIVE IRRIGATION INVESTMENT:				0
YEAR OF THE RATE CHANGE:				2003
LAST YEAR OF REPAYMENT PERIOD:				2038

INTEREST RATES OF INTEREST INCOME

1X07277 07213 07253 07253 07216

INTEREST RATES OF NEW DEFERRALS

1Y07520 07620 07540 07290 07080

OPERATING YEAR FACTORS

1F75000 75000 75000 75000 75000

PROJECTED REVENUE

22000	329491	333681	335220	335220	335220	335220	335220	2339272
22007	335220	335220	335220	335220	335220	335220	335220	2346540
22014	335220	335220	335220	335220	335220	335220	335220	2346540
22021	335220	335220	335220	335220	335220	335220	335220	2346540
22028	335220	335220	335220	335220	335220	335220	335220	2346540
22035	335220	335220	335220	335220	335220	335220	335220	2346540
22042	335220	335220	335220	335220	335220	335220	335220	2346540
22049	335220	335220	335220	335220	335220	335220	335220	2346540
	2676031	2680221	2681760	2681760	2681760	2681760	2681760	18765052 = TOTAL FOR 2

PROJECTED IRRIGATION ASSISTANCE

	NEW INVESTMENT	NEW INVESTMENT	NEW INVESTMENT	
32000	0	0	0	0
32003	0	0	0	0
32006	0	0	0	0
32009	0	0	0	0
32012	0	0	0	0
32015	0	0	0	0
32018	0	0	0	0
32021	0	0	0	0
32024	0	0	0	0

32027	0	0	0				0
32030	0	0	0	0	0	0	0
32033	0	0	0	0	0	0	0
32036	0	0	0	0	0	0	0
32039	0	0	0	0	0	0	0
32042	0	0	0	0	0	0	0
32045	0	0	0	0	0	0	0
32048	0	0	0	0	0	0	0
	0	0	0	0	0	0	0 = TOTAL FOR 3

CAPITALIZED CONTRACTUAL OBLIGATIONS

42000	0	0	0	0	-1041	-1073	-1104	-3218
42007	-1134	-1164	-1193	-1221	-1249	-1277	-1303	-8541
42014	-1329	-1355	-1380	-1404	-1428	-1451	-1474	-9821
42021	-1496	-1517	-1538	-1557	-1576	-1594	-1613	-10891
42028	-1629	-1644	-1659	-1674	-1685	-1696	-1706	-11693
42035	-1715	-1721	-1727	-1732	-1732	-1728	-1724	-12079
42042	-1718	-1716	-1714	-1712	-1714	-1714	-1714	-8574
	-9021	-9117	-9211	-9300	-10425	-8819	-8924	-64817 = TOTAL FOR 4

5	ALBE	ALBENI FALLS
5	BOIS	BOISE
5	BON2	BONNEVILLE - 2ND POWER HOUSE
5	BONN	BONNEVILLE
5	CHIE	CHIEF JOSEPH
5	COL3	COLUMBIA BASIN- 3RD POWER HOUSE
5	COLU	COLUMBIA BASIN
5	COUG	COUGAR
5	CRFB	COLUMBIA RIVER FISH MITIGATION
5	DETR	DETROIT-BIG CLIFF
5	DWOR	DWORSHAK
5	GREE	GREEN PETER-FOSTER
5	HILL	HILLS CREEK
5	HUNG	HUNGRY HORSE
5	ICEH	ICE HARBOR
5	JOHN	JOHN DAY
5	LIBB	LIBBY
5	LITT	LITTLE GOOSE
5	LOOK	LOOKOUT POINT-DEXTER
5	LOST	LOST CREEK
5	LOWG	LOWER GRANITE
5	LOWM	LOWER MONUMENTAL
5	LSFW	LOWER SNAKE F AND W
5	MCNA	MCNARY
5	MINI	MINIDOKA
5	STRU	STRUBE
5	THED	THE DALLES
5	YAKC	YAKIMA-CHANDLER
5	YAKR	YAKIMA-ROZA
5	ZABF	BPA PROGRAM

5 ZADB BUREAU DIRECT FUND  
5 ZAFW FISH, WILDLIFE & ENVIRONMENTAL  
5 ZBPA BONNEVILLE POWER ADMINISTRATION

## HISTORICAL

	O & M	INTEREST
5	ALBEX	0
5	BOISX	0
5	BONNX	0
5	CHIEX	0
5	COLUX	0
5	COUGX	0
5	DETRX	0
5	DWORX	0
5	GREEX	0
5	HILLX	0
5	HUNGX	0
5	ICEHX	0
5	JOHNX	0
5	LIBBX	0
5	LITTX	0
5	LOOKX	0
5	LOSTX	0
5	LOWGX	0
5	LOWMX	0
5	MCNAX	0
5	MINIX	0
5	THEDX	0
5	YAKCX	0
5	YAKRX	0
5	ZBPAX	0
5	ZACOX	0

PROJECTED O & M

0

0 = TOTAL FOR 6

61994ZABF 0  
0

0 = TOTAL FOR 6

## HISTORICAL FEDERAL INVESTMENTS

		ORIGINAL PROJECT	CURRENT PRINCIPAL	INTEREST RATE	DU E DATE	INSERVICE DATE	CALENDAR MONTH
6	1996	ZBPA X	6812	0	.02500	1985	1940
6	1996	ZBPA X	18906	0	.02500	1986	1941
6	1996	ZBPA X	461	0	.02500	1986 R	1941
6	1996	ZBPA X	8446	0	.02500	1987	1942

6	1996	ZBPA X	1052	0	.02500	1987 R	1942
6	1996	ZBPA X	16083	0	.02500	1988	1943
6	1996	ZBPA X	4538	0	.02500	1988 R	1943
6	1996	ZBPA X	583	0	.02500	1989	1944
6	1996	ZBPA X	249	0	.02500	1989 R	1944
6	1996	ZBPA X	1306	0	.02500	1990	1945
6	1996	ZBPA X	3366	0	.02500	1990 R	1945
6	1996	ZBPA X	2488	0	.02500	1991	1946
6	1996	ZBPA X	732	0	.02500	1991 R	1946
6	1996	ZBPA X	1330	0	.02500	1992	1947
6	1996	ZBPA X	1773	0	.02500	1992 R	1947
6	1996	ZBPA X	7468	0	.02500	1993	1948
6	1996	ZBPA X	2290	0	.02500	1993 R	1948
6	1996	ZBPA X	6809	0	.02500	1994	1949
6	1996	ZBPA X	2719	0	.02500	1994 R	1949
6	1996	ZBPA X	24111	0	.02500	1995	1950
6	1996	ZBPA X	6124	0	.02500	1995 R	1950
6	1996	ZBPA X	7040	0	.02500	1996	1951
6	1996	ZBPA X	13266	0	.02500	1996 R	1951
6	1996	ZBPA X	18610	0	.02500	1997	1952
6	1996	ZBPA X	8979	0	.02500	1997 R	1952
6	1996	ZBPA X	32262	0	.06330	1998	1953
6	1996	ZBPA X	15899	0	.06330	1998 R	1953
6	1996	ZBPA X	23614	0	.06510	1999	1954
6	1996	ZBPA X	17370	0	.06510	1999 R	1954
6	1996	ZBPA X	11827	11827	.06620	2000	1955
6	1996	ZBPA X	10283	10283	.06620	2000 R	1955
6	1996	ZBPA X	14573	14573	.06710	2001	1956
6	1996	ZBPA X	32221	32221	.06710	2001 R	1956
6	1996	ZBPA X	7933	7933	.06790	2002	1957
6	1996	ZBPA X	15980	15980	.06790	2002 R	1957
6	1996	ZBPA X	15593	15593	.06840	2003	1958
6	1996	ZBPA X	10654	10654	.06840	2003 R	1958
6	1996	ZBPA X	8157	8157	.06880	2004	1959
6	1996	ZBPA X	8863	8863	.06880	2004 R	1959
6	1996	ZBPA X	3598	3598	.06910	2005	1960
6	1996	ZBPA X	4218	4218	.06910	2005 R	1960
6	1996	ZBPA X	4468	4468	.06950	2006	1961
6	1996	ZBPA X	11271	11271	.06950	2006 R	1961
6	1996	ZBPA X	19597	19597	.06980	2007	1962
6	1996	ZBPA X	4877	4877	.06980	2007 R	1962
6	1996	ZBPA X	4876	4876	.07020	2008	1963
6	1996	ZBPA X	4330	4330	.07020	2008 R	1963
6	1996	ZBPA X	904	904	.07020	2008	1963
6	1996	ZBPA X	803	803	.07020	2008 R	1963
6	1996	ZBPA X	4151	4151	.07060	2009	1964
6	1996	ZBPA X	5738	5738	.07060	2009 R	1964
6	1996	ZBPA X	3706	3706	.07090	2010	1965
6	1996	ZBPA X	7248	7248	.07090	2010 R	1965
6	1996	ZBPA X	5202	5202	.07090	2010	1965
6	1996	ZBPA X	10171	10171	.07090	2010 R	1965
6	1996	ZBPA X	11830	11830	.07130	2011	1966
6	1996	ZBPA X	3049	3049	.07130	2011 R	1966

6	1996	ZBPA X	6647	6647	.07130	2011	1966
6	1996	ZBPA X	1714	1714	.07130	2011 R	1966
6	1996	ZBPA X	19003	19003	.07160	2012	1967
6	1996	ZBPA X	4566	4566	.07160	2012 R	1967
6	1996	ZBPA X	14300	14300	.07160	2012	1967
6	1996	ZBPA X	3436	3436	.07160	2012 R	1967
6	1996	ZBPA X	41070	41070	.07200	2013	1968
6	1996	ZBPA X	8076	8076	.07200	2013 R	1968
6	1996	ZBPA X	23202	23202	.07200	2013	1968
6	1996	ZBPA X	4562	4562	.07200	2013 R	1968
6	1996	ZBPA X	42237	42237	.07230	2014	1969
6	1996	ZBPA X	22537	22537	.07230	2014 R	1969
6	1996	ZBPA X	384	384	.07230	2014	1969
6	1996	ZBPA X	205	205	.07230	2014 R	1969
6	1996	ZBPA X	64977	64977	.07270	2015	1970
6	1996	ZBPA X	7995	7995	.07270	2015 R	1970
6	1996	ZBPA X	24412	24412	.07270	2015	1970
6	1996	ZBPA X	3003	3003	.07270	2015 R	1970
6	1996	ZBPA X	12025	12025	.07290	2016	1971
6	1996	ZBPA X	17766	17766	.07290	2016 R	1971
6	1996	ZBPA X	12149	12051	.07290	2016	1971
6	1996	ZBPA X	17949	17805	.07290	2016 R	1971
6	1996	ZBPA X	29326	29326	.07290	2017	1972
6	1996	ZBPA X	21170	21170	.07290	2017 R	1972
6	1996	ZBPA X	3980	3980	.07290	2017	1972
6	1996	ZBPA X	2873	2873	.07290	2017 R	1972
6	1996	ZBPA X	40207	33788	.07280	2018	1973
6	1996	ZBPA X	25770	21656	.07280	2018 R	1973
6	1996	ZBPA X	24826	16368	.07280	2018	1973
6	1996	ZBPA X	15912	10491	.07280	2018 R	1973
6	1996	ZBPA X	12079	12079	.07270	2019	1974
6	1996	ZBPA X	20984	20984	.07270	2019 R	1974
6	1996	ZBPA X	12563	12563	.07270	2019	1974
6	1996	ZBPA X	21826	21826	.07270	2019 R	1974
6	1996	ZBPA X	32026	32026	.07250	2020	1975
6	1996	ZBPA X	21916	21916	.07250	2020 R	1975
6	1996	ZBPA X	17158	17158	.07250	2020	1975
6	1996	ZBPA X	11742	11742	.07250	2020 R	1975
6	1996	ZBPA X	61025	61025	.07230	2021	1976
6	1996	ZBPA X	2212	2212	.07230	2021 R	1976
6	1996	ZBPA X	3948	3948	.07210	2022	1977
6	1996	ZBPA X	5380	5380	.07210	2022 R	1977
6	1996	ZBPA X	33702	33702	.07210	2022	1977
6	1996	ZBPA X	51049	4981	.07210	2022 R	1977
			1324696	999288			
				60.08800		198126	
					202671		
							325408 = TOTAL FOR 6

6	1995	ZABF X	17770	0	.08950	2013	1978 09
6	1995	ZABF X	24222	0	.08950	2013 R	1978 09
6	1998	ZABF X	3389	0	.08950	2013	1978 09
6	1998	ZABF X	4619	0	.08950	2013 R	1978 09

6	1995	ZABF X	7010	0	.09450	2014	1979	06
6	1995	ZABF X	9804	0	.09450	2014 R	1979	06
6	1995	ZABF X	26690	0	.09450	2014	1979	06
6	1995	ZABF X	21977	0	.09450	2014 R	1979	06
6	1995	ZABF X	6026	0	.09450	2014 R	1979	06
6	1995	ZABF X	21228	0	.09900	2014	1979	09
6	1995	ZABF X	14340	0	.09900	2014 R	1979	09
6	1995	ZABF X	10610	0	.09900	2014	1979	09
6	1995	ZABF X	2888	0	.09900	2014 R	1979	09
6	1998	ZABF X	1371	0	.09450	2014	1979	06
6	1998	ZABF X	1870	0	.09450	2014 R	1979	06
6	1998	ZABF X	150	0	.09450	2014	1979	06
6	1998	ZABF X	102	0	.09450	2014 R	1979	06
6	1998	ZABF X	98	0	.09900	2014	1979	09
6	1998	ZABF X	66	0	.09900	2014 R	1979	09
6	1998	ZABF X	605	0	.09900	2014	1979	09
6	1998	ZABF X	165	0	.09900	2014 R	1979	09
6	1995	ZABF X	39696	0	.13000	2015	1980	09
6	1995	ZABF X	10806	0	.13000	2015 R	1980	09
6	1995	ZABF X	44811	0	.13000	2015	1980	09
6	1995	ZABF X	1469	0	.13000	2015 R	1980	09
6	1995	ZABF X	9292	0	.13000	2015	1980	09
6	1995	ZABF X	4253	0	.13000	2015 R	1980	09
6	1998	ZABF X	2263	0	.13000	2015	1980	09
6	1998	ZABF X	616	0	.13000	2015 R	1980	09
6	1998	ZABF X	1707	0	.13000	2015	1980	09
6	1998	ZABF X	56	0	.13000	2015 R	1980	09
6	1998	ZABF X	21	0	.13000	2015	1980	09
6	1998	ZABF X	10	0	.13000	2015 R	1980	09
6	1995	ZABF X	119775	0	.16600	2016	1981	09
6	1995	ZABF X	54821	0	.16600	2016 R	1981	09
6	1998	ZABF X	277	0	.16600	2016	1981	09
6	1998	ZABF X	127	0	.16600	2016 R	1981	09
6	1995	ZABF X	34221	0	.14400	2017	1982	12
6	1995	ZABF X	15663	0	.14400	2017 R	1982	12
6	1995	ZABF X	9975	0	.14400	2017	1982	04
6	1995	ZABF X	4566	0	.14400	2017 R	1982	04
6	1995	ZABF X	46980	0	.14400	2017	1982	04
6	1995	ZABF X	37455	0	.14400	2017 R	1982	04
6	1995	ZABF X	3677	0	.14150	2017	1982	07
6	1995	ZABF X	-3677	0	.14150	2017	1987	07
6	1995	ZABF X	2932	0	.14150	2017 R	1982	07
6	1995	ZABF X	-2932	0	.14150	2017 R	1987	07
6	1995	ZABF X	77807	0	.14150	2017	1982	07
6	1995	ZABF X	-77807	0	.14150	2017	1987	07
6	1998	ZABF X	80	0	.14400	2017	1982	12
6	1998	ZABF X	36	0	.14400	2017 R	1982	12
6	1998	ZABF X	23	0	.14400	2017	1982	04
6	1998	ZABF X	11	0	.14400	2017 R	1982	04
6	1998	ZABF X	551	0	.14400	2017	1982	04
6	1998	ZABF X	439	0	.14400	2017 R	1982	04
6	1998	ZABF X	43	0	.14150	2017	1982	07
6	1998	ZABF X	-43	0	.14150	2017	1987	07

6	1998	ZABF X	34	0	.14150	2017 R	1982	07
6	1998	ZABF X	-34	0	.14150	2017 R	1987	07
6	1998	ZABF X	402	0	.14150	2017	1982	07
6	1998	ZABF X	-402	0	.14150	2017	1987	07
6	1998	ZABF X	105	0	.14150	2017 R	1982	07
6	1998	ZABF X	-105	0	.14150	2017 R	1987	07
6	1995	ZABF X	39741	0	.10850	2018	1983	11
6	1995	ZABF X	-39741	0	.10850	2018	1988	02
6	1995	ZABF X	29806	0	.11700	2018	1983	06
6	1995	ZABF X	814	0	.12250	2018	1983	09
6	1995	ZABF X	37235	0	.12250	2018	1983	09
6	1995	ZABF X	6708	0	.12250	2018 R	1983	09
6	1998	ZABF X	205	0	.10850	2018	1983	11
6	1998	ZABF X	-205	0	.10850	2018	1988	02
6	1998	ZABF X	54	0	.10850	2018 R	1983	11
6	1998	ZABF X	-54	0	.10850	2018 R	1988	02
6	1998	ZABF X	154	0	.11700	2018	1983	06 T
6	1998	ZABF X	40	0	.11700	2018 R	1983	06 T
6	1998	ZABF X	4	0	.12250	2018	1983	09
6	1998	ZABF X	1	0	.12250	2018 R	1983	09
6	1998	ZABF X	203	0	.12250	2018	1983	09
6	1998	ZABF X	35	0	.12250	2018 R	1983	09
6	1995	ZABF X	25283	0	.12300	2019	1984	11
6	1995	ZABF X	4555	0	.12300	2019 R	1984	11
6	1995	ZABF X	50567	0	.13050	2019	1984	09
6	1995	ZABF X	9109	0	.13050	2019 R	1984	09
6	1998	ZABF X	138	0	.12300	2019	1984	11
6	1998	ZABF X	24	0	.12300	2019 R	1984	11
6	1998	ZABF X	276	0	.13050	2019	1984	09
6	1998	ZABF X	48	0	.13050	2019 R	1984	09
6	1995	ZABF X	84278	0	.11250	2029	1985	06
6	1995	ZABF X	15182	0	.11250	2029 R	1985	06
6	1998	ZABF X	460	0	.11250	2029	1985	06
6	1998	ZABF X	80	0	.11250	2029 R	1985	06
6	1995	ZABF X	870	0	.08150	1996	1986	03 T
6	1995	ZABF X	157	0	.08150	1996 R	1986	03 T
6	1995	ZABF X	30161	0	.08150	1996	1986	03 T
6	1995	ZABF X	68194	0	.08150	1996 R	1986	03 T
6	1995	ZABF X	5161	0	.08950	2030	1986	06
6	1995	ZABF X	-5161	0	.08950	2030	1992	08
6	1995	ZABF X	11668	0	.08950	2030 R	1986	06
6	1995	ZABF X	-11668	0	.08950	2030 R	1992	08
6	1995	ZABF X	180054	0	.08950	2030	1986	06
6	1995	ZABF X	-180054	0	.08950	2030	1992	08
6	1995	ZABF X	3117	0	.08950	2030 R	1986	06
6	1995	ZABF X	-3117	0	.08950	2030 R	1992	08
6	1995	ZABF X	40000	0	.08950	2030 R	1986	06
6	1995	ZABF X	-40000	0	.08950	2030 R	1994	05
6	1995	ZABF X	57354	0	.08950	2030 R	1986	06
6	1998	ZABF X	5	0	.08150	1996	1986	03 T
6	1998	ZABF X	1	0	.08150	1996 R	1986	03 T
6	1998	ZABF X	443	0	.08150	1996	1986	03 T
6	1998	ZABF X	169	0	.08150	1996 R	1986	03 T

6	1998	ZABF X	76	0	.08950	2030	1986	06
6	1998	ZABF X	29	0	.08950	2030 R	1986	06
6	1998	ZABF X	1819	0	.08950	2030	1986	06
6	1998	ZABF X	722	0	.08950	2030 R	1986	06
6	1995	ZABF X	43236	0	.09300	2031	1987	04
6	1995	ZABF X	-43236	0	.09300	2031	1992	04
6	1995	ZABF X	54409	0	.09300	2031 R	1987	04
6	1995	ZABF X	-54409	0	.09300	2031 R	1992	04
6	1995	ZABF X	96519	0	.08350	1992	1987	06 T
6	1995	ZABF X	4113	0	.09550	2017	1987	07
6	1995	ZABF X	3274	0	.09550	2017 R	1987	07
6	1995	ZABF X	86958	0	.09550	2017	1987	07
6	1995	ZABF X	7903	0	.09550	2032	1987	07
6	1995	ZABF X	3109	0	.09550	2032 R	1987	07
6	1995	ZABF X	37342	0	.09550	2032	1987	07
6	1998	ZABF X	111	0	.09300	2031	1987	04
6	1998	ZABF X	-111	0	.09300	2031	1992	04
6	1998	ZABF X	281	0	.09300	2031	1987	04
6	1998	ZABF X	-281	0	.09300	2031	1992	04
6	1998	ZABF X	554	0	.09300	2031	1987	04
6	1998	ZABF X	-554	0	.09300	2031	1992	04
6	1998	ZABF X	1409	0	.09300	2031	1987	04
6	1998	ZABF X	-1409	0	.09300	2031	1992	04
6	1998	ZABF X	2498	0	.08350	1992	1987	06 T
6	1998	ZABF X	983	0	.08350	1992 R	1987	06 T
6	1998	ZABF X	48	0	.09550	2017	1987	07
6	1998	ZABF X	38	0	.09550	2017 R	1987	07
6	1998	ZABF X	569	0	.09550	2017	1987	07
6	1998	ZABF X	285	0	.09550	2032	1987	07
6	1998	ZABF X	112	0	.09550	2032 R	1987	07
6	1998	ZABF X	631	0	.09550	2032	1987	07
6	1998	ZABF X	618	0	.09550	2032 R	1987	07
6	1995	ZABF X	43417	0	.09500	2018	1988	02
6	1995	ZABF X	28513	0	.09500	2033	1988	02
6	1995	ZABF X	-28513	0	.09500	2033	1994	10
6	1995	ZABF X	27887	0	.09500	2033 R	1988	02
6	1995	ZABF X	-27887	0	.09500	2033 R	1994	10
6	1995	ZABF X	20677	0	.09500	2033	1988	02
6	1995	ZABF X	-20677	0	.09500	2033	1994	10
6	1995	ZABF X	22923	0	.09500	2033 R	1988	02
6	1995	ZABF X	-22923	0	.09500	2033 R	1994	10
6	1995	ZABF X	45870	0	.09500	2033 R	1988	02
6	1995	ZABF X	-45870	0	.09500	2033 R	1994	05
6	1995	ZABF X	9018	0	.09900	2033	1988	06
6	1995	ZABF X	30004	0	.09900	2033 R	1988	06
6	1998	ZABF X	618	0	.09550	2032 R	1987	07
6	1998	ZABF X	283	0	.09500	2018	1988	02
6	1998	ZABF X	954	0	.09500	2033	1988	02
6	1998	ZABF X	-954	0	.09500	2033	1994	05
6	1998	ZABF X	933	0	.09500	2033 R	1988	02
6	1998	ZABF X	-933	0	.09500	2033 R	1994	05
6	1998	ZABF X	518	0	.09500	2033	1988	02
6	1998	ZABF X	-518	0	.09500	2033	1994	05

6	1998	ZABF X	1725	0	.09500	2033 R	1988	02	
6	1998	ZABF X	-1725	0	.09500	2033 R	1994	05	
6	1998	ZABF X	226	0	.09900	2033	1988	06	
6	1998	ZABF X	752	0	.09900	2033 R	1988	06	
6	1995	ZABF X	16909	0	.08950	1999	1989	05	T
6	1995	ZABF X	56257	0	.08950	1999 R	1989	05	T
6	1998	ZABF X	424	0	.08950	1999	1989	05	T
6	1998	ZABF X	1410	0	.08950	1999 R	1989	05	T
6	1995	ZABF X	1149	1149	.09250	2030	1990	01	10
6	1995	ZABF X	3824	3824	.09250	2030 R	1990	01	10
6	1995	ZABF X	41894	41894	.09250	2030	1990	01	10
6	1998	ZABF X	29	29	.09250	2030	1990	01	10
6	1998	ZABF X	96	96	.09250	2030 R	1990	01	10
6	1998	ZABF X	3008	3008	.09250	2030	1990	01	10
6	1995	ZABF X	54145	0	.07550	1995	1991	02	T
6	1998	ZABF X	5855	0	.07550	1995	1991	02	T
6	1995	ZABF X	147521	0	.08800	2032	1992	04	
6	1995	ZABF X	50000	0	.07000	1997	1992	04	T
6	1995	ZABF X	80000	0	.06200	1995	1992	04	T
6	1995	ZABF X	28300	0	.07000	1997	1992	04	T
6	1995	ZABF X	150000	0	.08130	2032	1992	07	
6	1995	ZABF X	-103000	0	.08130	2032	1997	07	
6	1995	ZABF X	-70300	0	.08130	2032	1998	04	
6	1995	ZABF X	-67900	0	.08130	2032	1998	05	
6	1995	ZABF X	107800	92125	.06600	2000	1992	08	T
6	1995	ZABF X	107700	0	.07250	2007	1992	08	
6	1995	ZABF X	-107700	0	.07250	2007	1998	08	
6	1995	ZABF X	50000	0	.06050	1997	1992	10	T
6	1995	ZABF X	99962	0	.08350	2032	1992	10	
6	1998	ZABF X	2479	0	.08800	2032	1992	04	
6	1995	ZABF X	50000	50000	.06850	2034	1994	10	
6	1995	ZABF X	130000	0	.07800	2033	1993	02	
6	1995	ZABF X	-130000	0	.07800	2033	1998	05	
6	1995	ZABF X	100000	0	.07500	2033	1993	04	
6	1995	ZABF X	-100000	0	.07500	2033	1998	08	
6	1995	ZABF X	110000	110000	.06950	2033	1993	08	
6	1995	ZABF X	108400	108400	.06850	2034	1994	10	
6	1995	ZABF X	43155	0	.07100	1998	1994	05	01 P
6	1995	ZABF X	49489	0	.07100	1998	1994	05	01 P
6	1995	ZABF X	50000	50000	.07050	2034	1994	01	
6	1995	ZABF X	50000	0	.08200	2034	1994	05	
6	1995	ZABF X	55000	0	.07650	1999	1994	09	01 P
6	1995	ZABF X	55000	0	.08350	2001	1995	01	01 P
6	1995	ZABF X	41491	41491	.07700	2025	1995	07	05
6	1995	ZABF X	65000	65000	.07700	2025	1995	08	05
6	1995	ZAFW X	12100	12100	.07200	2010	1995	08	05
6	1998	ZABF X	8442	8442	.07700	2025	1995	07	05
6	1996	ZABF X	50000	50000	.05900	2003	1996	01	
6	1996	ZABF X	70000	70000	.07050	2006	1996	08	T
6	1997	ZAFW X	40000	40000	.06950	2012	1997	11	05
6	1998	ZABF X	4378	4378	.05900	2003	1996	08	T
6	1997	ZABF X	30000	30000	.06800	2004	1997	01	T
6	1997	ZABF X	80000	80000	.06900	2005	1997	05	T

6	1997	ZABF X	111254	111254	.06650	2007	1997	08	T
6	1998	ZABF X	75300	75300	.06000	2008	1998	04	T
6	1998	ZABF X	50000	50000	.06650	2028	1998	04	10
6	1998	ZABF X	72700	72700	.06000	2009	1998	05	T
6	1998	ZABF X	40000	40000	.06200	2011	1998	05	T
6	1998	ZABF X	98900	98900	.06700	2032	1998	05	10
6	1998	ZABF X	106600	106600	.05850	2023	1998	08	T
6	1998	ZABF X	112400	112400	.05850	2028	1998	08	T
6	1998	ZABF X	40000	40000	.05750	2008	1998	08	T
6	1999	ZABF X	60000	60000	.05900	2014	1999	02	T
6	1999	ZABF X	26200	26200	.05950	2004	1999	05	T
6	1999	ZABF X	40000	40000	.06200	2002	1999	09	T
			3834989	1695290					2139699 = TOTAL FOR 6
					164.67100				453144

PROJECTED FEDERAL INVESTMENTS

		ORIGINAL PROJECT	CURRENT PRINCIPAL	INTEREST RATE	DUUE DATE	INSERVICE DATE	CALENDAR MONTH		
6	2000	ZABF X	40000	40000	.06400	2003	2000	11	T
6	2000	ZABF X	189593	189593	.07540	2035	2000	03	
6	2000	ZABF X	15323	15323	.07540	2031	2000	03	
6	2000	ZAFW X	19603	19603	.07240	2015	2000	03	
6	2001	ZABF X	201604	201604	.07290	2036	2001	03	
6	2001	ZAFW X	9086	9086	.06920	2016	2001	03	
6	2002	ZABF X	233185	233185	.07080	2037	2002	03	
6	2002	ZAFW X	9047	9047	.06690	2017	2002	03	
6	2003	ZABF X	239131	239131	.06890	2038	2003	03	
6	2003	ZAFW X	9274	9274	.06500	2018	2003	03	
			965846	965846					0 = TOTAL FOR 6
					70.090				20012



## **CHAPTER 13**

# **REPAYMENT STUDY RESULTS CURRENT STUDY FY 2003**



**Summary of Interest Calculations  
Transmission  
FY 2003 Current Repayment Study**

INTEREST CALCULATION FOR FY 2000

TRANSMISSION FY 2003

REPAYMENT STUDY FOR TRANSMISSION INITIAL PROPOSAL 2002 RA

(ALL AMOUNTS IN \$1000)

PROJECT	TYPE	PRINCIPAL	RATE 1/	INTEREST	PREMIUM	TOTAL
BPA PROGRAM	HISTORICAL NEW 2/	1,643,190 244,916	X .06614 X .04025	= 108,677 = 9,859	24	
FISH, WILDLIFE & ENVIRONMENTAL	HISTORICAL NEW 2/	52,100 19,603	X .07008 X .03620	= 3,651 = 710		118,560
BONNEVILLE POWER ADMINISTRATION	HISTORICAL	999,288	X .07156	= 71,508		4,361
						71,508
						-----
						194,429
AFUDC						0
INTEREST INCOME	(REVENUE - A.O. - P.P. - BOND INT.) X RATE X 0.5					-8,847
	( 300,169 - 0 - 0 - 57,017) X .03638					-----
NET						185,582

0A.O. = ANNUAL OBLIGATIONS - CORPS/BUREAU O &amp; M

P.P. = PURCHASE POWER

1/ WEIGHTED AVERAGE RATE OF INTEREST BY INVESTMENT

2/ INTEREST RATE REFLECTS PARTIAL YEAR

INTEREST CALCULATION FOR FY 2001

TRANSMISSION FY 2003

REPAYMENT STUDY FOR TRANSMISSION INITIAL PROPOSAL 2002 RA

(ALL AMOUNTS IN \$1000)

PROJECT	TYPE	PRINCIPAL	RATE 1/	INTEREST	PREMIUM	TOTAL
BPA PROGRAM NEW 2/	HISTORICAL	1,795,629 201,604	X .06715 X .03645	= 120,575 = 7,348	822	
FISH, WILDLIFE & ENVIRONMENTAL NEW 2/	HISTORICAL	71,703 9,086	X .07071 X .03460	= 5,070 = 314		128,745
BONNEVILLE POWER ADMINISTRATION	HISTORICAL	977,178	X .07168	= 70,044		5,384
						70,044
						----- 204,173
AFUDC						0
INTEREST INCOME ( 256,261 -	(REVENUE - A.O. - P.P. - BOND INT.) X RATE X 0.5 0 - 62,824) X .03607					-6,976 ----- 197,197

0A.O. = ANNUAL OBLIGATIONS - CORPS/BUREAU O &amp; M

P.P. = PURCHASE POWER

1/ WEIGHTED AVERAGE RATE OF INTEREST BY INVESTMENT

2/ INTEREST RATE REFLECTS PARTIAL YEAR

INTEREST CALCULATION FOR FY 2002

TRANSMISSION FY 2003

REPAYMENT STUDY FOR TRANSMISSION INITIAL PROPOSAL 2002 RA

(ALL AMOUNTS IN \$1000)

PROJECT	TYPE	PRINCIPAL	RATE 1/	INTEREST	PREMIUM	TOTAL
BPA PROGRAM	HISTORICAL NEW 2/	1,984,963 233,185	X .06758 X .03540	= 134,137 = 8,255	5,185	
FISH, WILDLIFE & ENVIRONMENTAL	HISTORICAL NEW 2/	80,789 9,047	X .07054 X .03345	= 5,699 = 303		147,577
BONNEVILLE POWER ADMINISTRATION	HISTORICAL	930,384	X .07191	= 66,904		6,002
						66,904
						220,483
AFUDC						0
INTEREST INCOME	(REVENUE - A.O. - P.P. - BOND INT.) X RATE X 0.5					-10,453
	( 358,169 - 0 - 0 - 69,918) X .03627					-----
NET						210,030

OA.O. = ANNUAL OBLIGATIONS - CORPS/BUREAU O &amp; M

P.P. = PURCHASE POWER

1/ WEIGHTED AVERAGE RATE OF INTEREST BY INVESTMENT

2/ INTEREST RATE REFLECTS PARTIAL YEAR

## INTEREST CALCULATION FOR FY 2003

## TRANSMISSION FY 2003

## REPAYMENT STUDY FOR TRANSMISSION INITIAL PROPOSAL 2002 RA

(ALL AMOUNTS IN \$1000)

PROJECT	TYPE	PRINCIPAL	RATE 1/	INTEREST	PREMIUM	TOTAL
BPA PROGRAM	HISTORICAL NEW 2/	2,093,922 239,131	X .06739 X .03445	= 141,101 = 8,238	1,836	
FISH, WILDLIFE & ENVIRONMENTAL	HISTORICAL NEW 2/	89,836 9,274	X .07018 X .03250	= 6,304 = 301		151,175
BONNEVILLE POWER ADMINISTRATION	HISTORICAL	906,471	X .07201	= 65,280		6,605
						65,280
						-----
						223,060
AFUDC						0
INTEREST INCOME	(REVENUE - A.O. - P.P. - BOND INT.) X RATE X 0.5					-10,586
	( 365,608 - 0 - 0 - 73,705) X .03627					-----
NET						212,474

0A.O. = ANNUAL OBLIGATIONS - CORPS/BUREAU O &amp; M

P.P. = PURCHASE POWER

1/ WEIGHTED AVERAGE RATE OF INTEREST BY INVESTMENT

2/ INTEREST RATE REFLECTS PARTIAL YEAR

INTEREST CALCULATION FOR FY 2004      TRANSMISSION FY 2003      REPAYMENT STUDY FOR TRANSMISSION INITIAL PROPOSAL 2002 RA

(ALL AMOUNTS IN \$1000)

PROJECT	TYPE	PRINCIPAL	RATE 1/	INTEREST	PREMIUM	TOTAL
BPA PROGRAM	HISTORICAL NEW 2/	2,206,166 137,969	X .06768 X .03445	= 149,305 = 4,753	1,918	
FISH, WILDLIFE & ENVIRONMENTAL	HISTORICAL	99,110	X .06969	= 6,907		155,976
BONNEVILLE POWER ADMINISTRATION	HISTORICAL	880,224	X .07212	= 63,484		6,907
						63,484
						-----
						226,367
AFUDC						0
INTEREST INCOME	(REVENUE - A.O. - P.P. - BOND INT.) X RATE X 0.5					-10,368
	( 365,608 - 0 - -1,041 - 79,297) X .03608					-----
NET						215,999

O.A.O. = ANNUAL OBLIGATIONS - CORPS/BUREAU O & M

P.P. = PURCHASE POWER

1/ WEIGHTED AVERAGE RATE OF INTEREST BY INVESTMENT

2/ INTEREST RATE REFLECTS PARTIAL YEAR

INTEREST CALCULATION FOR FY 2005

TRANSMISSION FY 2003

REPAYMENT STUDY FOR TRANSMISSION INITIAL PROPOSAL 2002 RA

(ALL AMOUNTS IN \$1000)

PROJECT	TYPE	PRINCIPAL	RATE 1/	INTEREST	PREMIUM	TOTAL
BPA PROGRAM	HISTORICAL NEW 2/	2,252,359 141,467	X .06770 X .03445	= 152,473 = 4,874	3,986	
FISH, WILDLIFE & ENVIRONMENTAL	HISTORICAL	99,110	X .06969	= 6,907		161,333
BONNEVILLE POWER ADMINISTRATION	HISTORICAL	821,350	X .07215	= 59,261		6,907
						59,261
						-----
						227,501
AFUDC						0
INTEREST INCOME	(REVENUE - A.O. - P.P. - BOND INT.) X RATE X 0.5					-10,311
	( 365,608 - 0 - -1,073 - 80,911) X .03608					-----
NET						217,190

O.A.O. = ANNUAL OBLIGATIONS - CORPS/BUREAU O &amp; M

P.P. = PURCHASE POWER

1/ WEIGHTED AVERAGE RATE OF INTEREST BY INVESTMENT

2/ INTEREST RATE REFLECTS PARTIAL YEAR

INTEREST CALCULATION FOR FY 2006

TRANSMISSION FY 2003

REPAYMENT STUDY FOR TRANSMISSION INITIAL PROPOSAL 2002 RA

(ALL AMOUNTS IN \$1000)

PROJECT	TYPE	PRINCIPAL	RATE 1/	INTEREST	PREMIUM	TOTAL
BPA PROGRAM	HISTORICAL NEW 2/	2,252,151 144,854	X .06751 X .03445	= 152,050 = 4,990	4,035	
FISH, WILDLIFE & ENVIRONMENTAL	HISTORICAL	99,110	X .06969	= 6,907		161,075
BONNEVILLE POWER ADMINISTRATION	HISTORICAL	813,534	X .07218	= 58,721		6,907
						58,721
						-----
						226,703
AFUDC						0
INTEREST INCOME	(REVENUE - A.O. - P.P. - BOND INT.) X RATE X 0.5					-10,318
	( 365,608 - 0 - -1,104 - 80,730) X .03608					-----
NET						216,385

OA.O. = ANNUAL OBLIGATIONS - CORPS/BUREAU O &amp; M

P.P. = PURCHASE POWER

1/ WEIGHTED AVERAGE RATE OF INTEREST BY INVESTMENT

2/ INTEREST RATE REFLECTS PARTIAL YEAR

INTEREST CALCULATION FOR FY 2007

TRANSMISSION FY 2003

REPAYMENT STUDY FOR TRANSMISSION INITIAL PROPOSAL 2002 RA

(ALL AMOUNTS IN \$1000)

PROJECT	TYPE	PRINCIPAL	RATE 1/	INTEREST	PREMIUM	TOTAL
BPA PROGRAM	HISTORICAL NEW 2/	2,262,417 148,057	X .06729 X .03445	= 152,225 = 5,101	1,108	
FISH, WILDLIFE & ENVIRONMENTAL	HISTORICAL	99,110	X .06969	= 6,907		158,434
BONNEVILLE POWER ADMINISTRATION	HISTORICAL	797,795	X .07223	= 57,627		6,907
						57,627
						-----
						222,968
AFUDC						0
INTEREST INCOME	(REVENUE - A.O. - P.P. - BOND INT.) X RATE X 0.5					-10,315
	( 365,608 - 0 - -1,134 - 80,844) X .03608					-----
NET						212,653

0A.O. = ANNUAL OBLIGATIONS - CORPS/BUREAU O &amp; M

P.P. = PURCHASE POWER

1/ WEIGHTED AVERAGE RATE OF INTEREST BY INVESTMENT

2/ INTEREST RATE REFLECTS PARTIAL YEAR

INTEREST CALCULATION FOR FY 2008

TRANSMISSION FY 2003

REPAYMENT STUDY FOR TRANSMISSION INITIAL PROPOSAL 2002 RA

(ALL AMOUNTS IN \$1000)

PROJECT	TYPE	PRINCIPAL	RATE 1/	INTEREST	PREMIUM	TOTAL
BPA PROGRAM	HISTORICAL NEW 2/	2,280,859 150,933	X .06736 X .03445	= 153,644 = 5,200	1,604	
FISH, WILDLIFE & ENVIRONMENTAL	HISTORICAL	99,110	X .06969	= 6,907		160,448
BONNEVILLE POWER ADMINISTRATION	HISTORICAL	773,321	X .07231	= 55,919		6,907
						55,919
						-----
						223,274
AFUDC						0
INTEREST INCOME	(REVENUE - A.O. - P.P. - BOND INT.) X RATE X 0.5					-10,290
	( 365,608 - 0 - -1,164 - 81,578) X .03608					-----
NET						212,984

OA.O. = ANNUAL OBLIGATIONS - CORPS/BUREAU O &amp; M

P.P. = PURCHASE POWER

1/ WEIGHTED AVERAGE RATE OF INTEREST BY INVESTMENT

2/ INTEREST RATE REFLECTS PARTIAL YEAR

INTEREST CALCULATION FOR FY 2009      TRANSMISSION FY 2003      REPAYMENT STUDY FOR TRANSMISSION INITIAL PROPOSAL 2002 RA

(ALL AMOUNTS IN \$1000)						
PROJECT	TYPE	PRINCIPAL	RATE 1/	INTEREST	PREMIUM	TOTAL
BPA PROGRAM	HISTORICAL NEW 2/	2,288,917 153,462	X .06778 X .03445	= 155,146 = 5,287	1,794	162,227
FISH, WILDLIFE & ENVIRONMENTAL	HISTORICAL	99,110	X .06969	= 6,907		6,907
BONNEVILLE POWER ADMINISTRATION	HISTORICAL	762,408	X .07234	= 55,154		55,154
						----- 224,288
AFUDC						0
INTEREST INCOME	(REVENUE - A.O. - P.P. - BOND INT.) X RATE X 0.5					-10,263
	( 365,608 - 0 - -1,193 - 82,352) X .03608					----- 214,025
NET						

0A.O. = ANNUAL OBLIGATIONS - CORPS/BUREAU O & M

P.P. = PURCHASE POWER

1/ WEIGHTED AVERAGE RATE OF INTEREST BY INVESTMENT

2/ INTEREST RATE REFLECTS PARTIAL YEAR

INTEREST CALCULATION FOR FY 2010

TRANSMISSION FY 2003

REPAYMENT STUDY FOR TRANSMISSION INITIAL PROPOSAL 2002 RA

(ALL AMOUNTS IN \$1000)

PROJECT	TYPE	PRINCIPAL	RATE 1/	INTEREST	PREMIUM	TOTAL
BPA PROGRAM	HISTORICAL NEW 2/	2,336,962 155,555	X .06799 X .03445	= 158,891 = 5,359		
FISH, WILDLIFE & ENVIRONMENTAL	HISTORICAL	99,110	X .06969	= 6,907		164,250
BONNEVILLE POWER ADMINISTRATION	HISTORICAL	715,049	X .07234	= 51,725		6,907
						51,725
						-----
						222,882
AFUDC						0
INTEREST INCOME	(REVENUE - A.O. - P.P. - BOND INT.) X RATE X 0.5					-10,196
	( 365,608 - 0 - -1,221 - 84,242) X .03608					-----
NET						212,686

0A.O. = ANNUAL OBLIGATIONS - CORPS/BUREAU O &amp; M

P.P. = PURCHASE POWER

1/ WEIGHTED AVERAGE RATE OF INTEREST BY INVESTMENT

2/ INTEREST RATE REFLECTS PARTIAL YEAR

INTEREST CALCULATION FOR FY 2011

TRANSMISSION FY 2003

REPAYMENT STUDY FOR TRANSMISSION INITIAL PROPOSAL 2002 RA

(ALL AMOUNTS IN \$1000)

PROJECT	TYPE	PRINCIPAL	RATE 1/	INTEREST	PREMIUM	TOTAL
BPA PROGRAM	HISTORICAL NEW 2/	2,492,517 157,500	X .06805 X .03445	= 169,609 = 5,426		175,035
FISH, WILDLIFE & ENVIRONMENTAL	HISTORICAL	87,010	X .06937	= 6,036		6,036
BONNEVILLE POWER ADMINISTRATION	HISTORICAL	573,006	X .07230	= 41,429		41,429
						222,500
AFUDC						0
INTEREST INCOME	(REVENUE - A.O. - P.P. - BOND INT.) X RATE X 0.5					-10,019
	( 365,608 - 0 - -1,249 - 89,181) X .03608					-----
NET						212,481

0A.O. = ANNUAL OBLIGATIONS - CORPS/BUREAU O &amp; M

P.P. = PURCHASE POWER

1/ WEIGHTED AVERAGE RATE OF INTEREST BY INVESTMENT

2/ INTEREST RATE REFLECTS PARTIAL YEAR

INTEREST CALCULATION FOR FY 2012

TRANSMISSION FY 2003

REPAYMENT STUDY FOR TRANSMISSION INITIAL PROPOSAL 2002 RA

(ALL AMOUNTS IN \$1000)

PROJECT	TYPE	PRINCIPAL	RATE 1/	INTEREST	PREMIUM	TOTAL
BPA PROGRAM	HISTORICAL NEW 2/	2,610,017 159,468	X .06819 X .03445	= 177,981 = 5,494		
FISH, WILDLIFE & ENVIRONMENTAL	HISTORICAL	87,010	X .06937	= 6,036		183,475
BONNEVILLE POWER ADMINISTRATION	HISTORICAL	458,630	X .07227	= 33,147		6,036
						33,147
						222,658
AFUDC						0
INTEREST INCOME	(REVENUE - A.O. - P.P. - BOND INT.) X RATE X 0.5					-9,868
	( 365,608 - 0 - -1,277 - 93,384) X .03608					-----
NET						212,790

0A.O. = ANNUAL OBLIGATIONS - CORPS/BUREAU O &amp; M

P.P. = PURCHASE POWER

1/ WEIGHTED AVERAGE RATE OF INTEREST BY INVESTMENT

2/ INTEREST RATE REFLECTS PARTIAL YEAR

INTEREST CALCULATION FOR FY 2013

TRANSMISSION FY 2003

REPAYMENT STUDY FOR TRANSMISSION INITIAL PROPOSAL 2002 RA

(ALL AMOUNTS IN \$1000)

PROJECT	TYPE	PRINCIPAL	RATE 1/	INTEREST	PREMIUM	TOTAL
BPA PROGRAM	HISTORICAL NEW 2/	2,769,485 161,479	X .06823 X .03445	= 188,968 = 5,563		194,531
FISH, WILDLIFE & ENVIRONMENTAL	HISTORICAL	47,010	X .06926	= 3,256		3,256
BONNEVILLE POWER ADMINISTRATION	HISTORICAL	344,535	X .07226	= 24,897		24,897
						222,684
AFUDC						0
INTEREST INCOME	(REVENUE - A.O. - P.P. - BOND INT.) X RATE X 0.5					-9,720
	( 365,608 - 0 - -1,303 - 97,506) X .03608					----- 212,964

0A.O. = ANNUAL OBLIGATIONS - CORPS/BUREAU O &amp; M

P.P. = PURCHASE POWER

1/ WEIGHTED AVERAGE RATE OF INTEREST BY INVESTMENT

2/ INTEREST RATE REFLECTS PARTIAL YEAR

INTEREST CALCULATION FOR FY 2014

TRANSMISSION FY 2003

REPAYMENT STUDY FOR TRANSMISSION INITIAL PROPOSAL 2002 RA

(ALL AMOUNTS IN \$1000)

PROJECT	TYPE	PRINCIPAL	RATE 1/	INTEREST	PREMIUM	TOTAL
BPA PROGRAM	HISTORICAL NEW 2/	2,930,964 163,526	X .06827 X .03445	= 200,094 = 5,633		
FISH, WILDLIFE & ENVIRONMENTAL	HISTORICAL	47,010	X .06926	= 3,256		205,727
BONNEVILLE POWER ADMINISTRATION	HISTORICAL	190,588	X .07226	= 13,773		3,256
						13,773
						-----
						222,756
AFUDC						0
INTEREST INCOME	(REVENUE - A.O. - P.P. - BOND INT.) X RATE X 0.5					-9,520
	( 365,608 - 0 - -1,329 - 103,086) X .03608					-----
NET						213,236

0A.O. = ANNUAL OBLIGATIONS - CORPS/BUREAU O &amp; M

P.P. = PURCHASE POWER

1/ WEIGHTED AVERAGE RATE OF INTEREST BY INVESTMENT

2/ INTEREST RATE REFLECTS PARTIAL YEAR

INTEREST CALCULATION FOR FY 2015

TRANSMISSION FY 2003

REPAYMENT STUDY FOR TRANSMISSION INITIAL PROPOSAL 2002 RA

(ALL AMOUNTS IN \$1000)

PROJECT	TYPE	PRINCIPAL	RATE 1/	INTEREST	PREMIUM	TOTAL
BPA PROGRAM	HISTORICAL NEW 2/	3,034,490 165,720	X .06849 X .03445	= 207,821 = 5,709	1,512	
FISH, WILDLIFE & ENVIRONMENTAL	HISTORICAL	47,010	X .06926	= 3,256		215,042
BONNEVILLE POWER ADMINISTRATION	HISTORICAL	96,887	X .07220	= 6,996		3,256
						6,996
						225,294
AFUDC						0
INTEREST INCOME	(REVENUE - A.O. - P.P. - BOND INT.) X RATE X 0.5					-9,381
	( 365,608 - 0 - -1,355 - 106,968) X .03608					-----
NET						215,913

0A.O. = ANNUAL OBLIGATIONS - CORPS/BUREAU O &amp; M

P.P. = PURCHASE POWER

1/ WEIGHTED AVERAGE RATE OF INTEREST BY INVESTMENT

2/ INTEREST RATE REFLECTS PARTIAL YEAR

INTEREST CALCULATION FOR FY 2016

TRANSMISSION FY 2003

REPAYMENT STUDY FOR TRANSMISSION INITIAL PROPOSAL 2002 RA

(ALL AMOUNTS IN \$1000)

PROJECT	TYPE	PRINCIPAL	RATE 1/	INTEREST	PREMIUM	TOTAL
BPA PROGRAM NEW 2/	HISTORICAL	3,165,650 168,004	X .06846 X .03445	= 216,720 = 5,788	5,711	
FISH, WILDLIFE & ENVIRONMENTAL	HISTORICAL	27,407	X .06702	= 1,837		228,219
					1,837	
						230,056
AFUDC						0
INTEREST INCOME	(REVENUE - A.O. - P.P. - BOND INT.) X RATE X 0.5					-9,246
	( 365,608 - 0 - -1,380 - 110,728) X .03608					
NET						220,810

O.A.O. = ANNUAL OBLIGATIONS - CORPS/BUREAU O &amp; M

P.P. = PURCHASE POWER

1/ WEIGHTED AVERAGE RATE OF INTEREST BY INVESTMENT

2/ INTEREST RATE REFLECTS PARTIAL YEAR

1

INTEREST CALCULATION FOR FY 2017      TRANSMISSION FY 2003      REPAYMENT STUDY FOR TRANSMISSION INITIAL PROPOSAL 2002 RA

(ALL AMOUNTS IN \$1000)

PROJECT	TYPE	PRINCIPAL	RATE 1/	INTEREST	PREMIUM	TOTAL
BPA PROGRAM	HISTORICAL NEW 2/	3,196,562 170,318	X .06829 X .03445	= 218,301 = 5,867	5,489	
FISH, WILDLIFE & ENVIRONMENTAL	HISTORICAL	18,321	X .06594	= 1,208		229,657
					1,208	
						230,865
AFUDC						0
INTEREST INCOME	(REVENUE - A.O. - P.P. - BOND INT.) X RATE X 0.5					-9,229
	( 365,608 - 0 - -1,404 - 111,225) X .03608					221,636
NET						

0A.O. = ANNUAL OBLIGATIONS - CORPS/BUREAU O & M

P.P. = PURCHASE POWER

1/ WEIGHTED AVERAGE RATE OF INTEREST BY INVESTMENT

2/ INTEREST RATE REFLECTS PARTIAL YEAR

1

INTEREST CALCULATION FOR FY 2018

TRANSMISSION FY 2003

REPAYMENT STUDY FOR TRANSMISSION INITIAL PROPOSAL 2002 RA

(ALL AMOUNTS IN \$1000)

PROJECT	TYPE	PRINCIPAL	RATE 1/	INTEREST	PREMIUM	TOTAL
BPA PROGRAM NEW 2/	HISTORICAL	3,230,551 172,710	X .06820 X .03445	= 220,321 = 5,950	5,105	
FISH, WILDLIFE & ENVIRONMENTAL	HISTORICAL	9,274	X .06500	= 603		231,376
					603	
						231,979
AFUDC						0
INTEREST INCOME	(REVENUE - A.O. - P.P. - BOND INT.) X RATE X 0.5					-9,203
	( 365,608 - 0 - -1,428 - 111,951) X .03608					----- 222,776
NET						

O.A.O. = ANNUAL OBLIGATIONS - CORPS/BUREAU O &amp; M

P.P. = PURCHASE POWER

1/ WEIGHTED AVERAGE RATE OF INTEREST BY INVESTMENT

2/ INTEREST RATE REFLECTS PARTIAL YEAR

1

INTEREST CALCULATION FOR FY 2019

TRANSMISSION FY 2003

REPAYMENT STUDY FOR TRANSMISSION INITIAL PROPOSAL 2002 RA

(ALL AMOUNTS IN \$1000)

PROJECT	TYPE	PRINCIPAL	RATE 1/	INTEREST	PREMIUM	TOTAL
BPA PROGRAM	HISTORICAL NEW 2/	3,268,275 175,079	X .06813 X .03445	= 222,666 = 6,031	3,590	232,287
AFUDC						0
INTEREST INCOME	(REVENUE - A.O. - P.P. - BOND INT.) X RATE X 0.5					-9,172
	( 365,608 - 0 - -1,451 - 112,843) X .03608					----- 223,115

0A.O. = ANNUAL OBLIGATIONS - CORPS/BUREAU O &amp; M

P.P. = PURCHASE POWER

1/ WEIGHTED AVERAGE RATE OF INTEREST BY INVESTMENT

2/ INTEREST RATE REFLECTS PARTIAL YEAR

1

INTEREST CALCULATION FOR FY 2020

TRANSMISSION FY 2003

REPAYMENT STUDY FOR TRANSMISSION INITIAL PROPOSAL 2002 RA

(ALL AMOUNTS IN \$1000)

PROJECT	TYPE	PRINCIPAL	RATE 1/	INTEREST	PREMIUM	TOTAL
BPA PROGRAM	HISTORICAL NEW 2/	3,299,410 177,412	X .06810 X .03445	= 224,684 = 6,112	6,018	236,814
AFUDC						236,814
INTEREST INCOME	(REVENUE - A.O. - P.P. - BOND INT.) X RATE X 0.5					-9,136
	( 365,608 - 0 - -1,474 - 113,872) X .03608					227,678
NET						

0A.O. = ANNUAL OBLIGATIONS - CORPS/BUREAU O &amp; M

P.P. = PURCHASE POWER

1/ WEIGHTED AVERAGE RATE OF INTEREST BY INVESTMENT

2/ INTEREST RATE REFLECTS PARTIAL YEAR

1

INTEREST CALCULATION FOR FY 2021

TRANSMISSION FY 2003

REPAYMENT STUDY FOR TRANSMISSION INITIAL PROPOSAL 2002 RA

(ALL AMOUNTS IN \$1000)

PROJECT	TYPE	PRINCIPAL	RATE 1/	INTEREST	PREMIUM	TOTAL
BPA PROGRAM	HISTORICAL NEW 2/	3,337,418 179,650	X .06811 X .03445	= 227,298 = 6,189	6,057	239,544
AFUDC						0
INTEREST INCOME	(REVENUE - A.O. - P.P. - BOND INT.) X RATE X 0.5					-9,089
	( 365,608 - 0 - -1,496 - 115,198) X .03608					----- 230,455
NET						

0A.O. = ANNUAL OBLIGATIONS - CORPS/BUREAU O &amp; M

P.P. = PURCHASE POWER

1/ WEIGHTED AVERAGE RATE OF INTEREST BY INVESTMENT

2/ INTEREST RATE REFLECTS PARTIAL YEAR

1

INTEREST CALCULATION FOR FY 2022

TRANSMISSION FY 2003

REPAYMENT STUDY FOR TRANSMISSION INITIAL PROPOSAL 2002 RA

(ALL AMOUNTS IN \$1000)

PROJECT	TYPE	PRINCIPAL	RATE 1/	INTEREST	PREMIUM	TOTAL
BPA PROGRAM	HISTORICAL NEW 2/	3,380,419 181,731	X .06812 X .03445	= 230,261 = 6,261	5,920	242,442
AFUDC						242,442
INTEREST INCOME	(REVENUE - A.O. - P.P. - BOND INT.) X RATE X 0.5					-9,035
	( 365,608 - 0 - -1,517 - 116,697) X .03608					----- 233,407

0A.O. = ANNUAL OBLIGATIONS - CORPS/BUREAU O &amp; M

P.P. = PURCHASE POWER

1/ WEIGHTED AVERAGE RATE OF INTEREST BY INVESTMENT

2/ INTEREST RATE REFLECTS PARTIAL YEAR

INTEREST CALCULATION FOR FY 2023

TRANSMISSION FY 2003

REPAYMENT STUDY FOR TRANSMISSION INITIAL PROPOSAL 2002 RA

(ALL AMOUNTS IN \$1000)

PROJECT	TYPE	PRINCIPAL	RATE 1/	INTEREST	PREMIUM	TOTAL
BPA PROGRAM	HISTORICAL NEW 2/	3,428,432 183,690	X .06813 X .03445	= 233,569 = 6,328	1,226	241,123
AFUDC						241,123
INTEREST INCOME	(REVENUE - A.O. - P.P. - BOND INT.) X RATE X 0.5					-8,976
	( 365,608 - 0 - -1,538 - 118,369) X .03608					232,147
NET						

0A.O. = ANNUAL OBLIGATIONS - CORPS/BUREAU O &amp; M

P.P. = PURCHASE POWER

1/ WEIGHTED AVERAGE RATE OF INTEREST BY INVESTMENT

2/ INTEREST RATE REFLECTS PARTIAL YEAR

INTEREST CALCULATION FOR FY 2024

TRANSMISSION FY 2003

REPAYMENT STUDY FOR TRANSMISSION INITIAL PROPOSAL 2002 RA

(ALL AMOUNTS IN \$1000)

PROJECT	TYPE	PRINCIPAL	RATE 1/	INTEREST	PREMIUM	TOTAL
BPA PROGRAM	HISTORICAL NEW 2/	3,477,123 185,513	X .06846 X .03445	= 238,033 = 6,391	5,411	249,835
AFUDC						249,835
INTEREST INCOME	(REVENUE - A.O. - P.P. - BOND INT.) X RATE X 0.5					-8,895
	( 365,608 - 0 - -1,557 - 120,616) X .03608					----- 240,940

0A.O. = ANNUAL OBLIGATIONS - CORPS/BUREAU O &amp; M

P.P. = PURCHASE POWER

1/ WEIGHTED AVERAGE RATE OF INTEREST BY INVESTMENT

2/ INTEREST RATE REFLECTS PARTIAL YEAR

INTEREST CALCULATION FOR FY 2025

TRANSMISSION FY 2003

REPAYMENT STUDY FOR TRANSMISSION INITIAL PROPOSAL 2002 RA

(ALL AMOUNTS IN \$1000)

PROJECT	TYPE	PRINCIPAL	RATE 1/	INTEREST	PREMIUM	TOTAL
BPA PROGRAM	HISTORICAL NEW 2/	3,536,411 187,148	X .06846 X .03445	= 242,118 = 6,447	5,215	253,780
AFUDC						0
INTEREST INCOME	(REVENUE - A.O. - P.P. - BOND INT.) X RATE X 0.5					-8,822
	( 365,608 - 0 - -1,576 - 122,672) X .03608					----- 244,958

0A.O. = ANNUAL OBLIGATIONS - CORPS/BUREAU O &amp; M

P.P. = PURCHASE POWER

1/ WEIGHTED AVERAGE RATE OF INTEREST BY INVESTMENT

2/ INTEREST RATE REFLECTS PARTIAL YEAR

INTEREST CALCULATION FOR FY 2026

TRANSMISSION FY 2003

REPAYMENT STUDY FOR TRANSMISSION INITIAL PROPOSAL 2002 RA

(ALL AMOUNTS IN \$1000)

PROJECT	TYPE	PRINCIPAL	RATE 1/	INTEREST	PREMIUM	TOTAL
BPA PROGRAM	HISTORICAL NEW 2/	3,601,333 188,720	X .06847 X .03445	= 246,591 = 6,501	4,985	
						258,077
						- - - - -
						258,077
AFUDC						0
INTEREST INCOME	(REVENUE - A.O. - P.P. - BOND INT.) X RATE X 0.5					-8,741
	( 365,608 - 0 - -1,594 - 124,921) X .03608					- - - - -
NET						249,336

0A.O. = ANNUAL OBLIGATIONS - CORPS/BUREAU O &amp; M

P.P. = PURCHASE POWER

1/ WEIGHTED AVERAGE RATE OF INTEREST BY INVESTMENT

2/ INTEREST RATE REFLECTS PARTIAL YEAR

INTEREST CALCULATION FOR FY 2027

TRANSMISSION FY 2003

REPAYMENT STUDY FOR TRANSMISSION INITIAL PROPOSAL 2002 RA

(ALL AMOUNTS IN \$1000)

PROJECT	TYPE	PRINCIPAL	RATE 1/	INTEREST	PREMIUM	TOTAL
BPA PROGRAM	HISTORICAL NEW 2/	3,672,187 190,316	X .06848 X .03445	= 251,472 = 6,556	2,800	260,828
AFUDC						0
INTEREST INCOME	(REVENUE - A.O. - P.P. - BOND INT.) X RATE X 0.5					-8,654
	( 365,608 - 0 - -1,613 - 127,376) X .03608					----- 252,174

0A.O. = ANNUAL OBLIGATIONS - CORPS/BUREAU O &amp; M

P.P. = PURCHASE POWER

1/ WEIGHTED AVERAGE RATE OF INTEREST BY INVESTMENT

2/ INTEREST RATE REFLECTS PARTIAL YEAR

INTEREST CALCULATION FOR FY 2028

TRANSMISSION FY 2003

REPAYMENT STUDY FOR TRANSMISSION INITIAL PROPOSAL 2002 RA

(ALL AMOUNTS IN \$1000)

PROJECT	TYPE	PRINCIPAL	RATE 1/	INTEREST	PREMIUM	TOTAL
BPA PROGRAM	HISTORICAL NEW 2/	3,747,458 191,894	X .06852 X .03445	= 256,779 = 6,611		263,390
AFUDC						0
INTEREST INCOME	(REVENUE - A.O. - P.P. - BOND INT.) X RATE X 0.5					-8,558
	( 365,608 - 0 - -1,629 - 130,042) X .03608					----- 254,832

0A.O. = ANNUAL OBLIGATIONS - CORPS/BUREAU O &amp; M

P.P. = PURCHASE POWER

1/ WEIGHTED AVERAGE RATE OF INTEREST BY INVESTMENT

2/ INTEREST RATE REFLECTS PARTIAL YEAR

INTEREST CALCULATION FOR FY 2029

TRANSMISSION FY 2003

REPAYMENT STUDY FOR TRANSMISSION INITIAL PROPOSAL 2002 RA

(ALL AMOUNTS IN \$1000)

PROJECT	TYPE	PRINCIPAL	RATE 1/	INTEREST	PREMIUM	TOTAL
BPA PROGRAM	HISTORICAL NEW 2/	3,826,947 193,510	X .06883 X .03445	= 263,424 = 6,666	4,020	
						274,110
						- - - - -
						274,110
AFUDC						0
INTEREST INCOME	(REVENUE - A.O. - P.P. - BOND INT.) X RATE X 0.5					-8,438
	( 365,608 - 0 - -1,644 - 133,379) X .03608					- - - - -
NET						265,672

0A.O. = ANNUAL OBLIGATIONS - CORPS/BUREAU O &amp; M

P.P. = PURCHASE POWER

1/ WEIGHTED AVERAGE RATE OF INTEREST BY INVESTMENT

2/ INTEREST RATE REFLECTS PARTIAL YEAR

INTEREST CALCULATION FOR FY 2030

TRANSMISSION FY 2003

REPAYMENT STUDY FOR TRANSMISSION INITIAL PROPOSAL 2002 RA

(ALL AMOUNTS IN \$1000)

PROJECT	TYPE	PRINCIPAL	RATE 1/	INTEREST	PREMIUM	TOTAL
BPA PROGRAM	HISTORICAL NEW 2/	3,918,877 195,226	X .06884 X .03445	= 269,758 = 6,726	2,951	279,435
AFUDC						0
INTEREST INCOME	(REVENUE - A.O. - P.P. - BOND INT.) X RATE X 0.5					-8,324
	( 365,608 - 0 - -1,659 - 136,559) X .03608					----- 271,111

0A.O. = ANNUAL OBLIGATIONS - CORPS/BUREAU O &amp; M

P.P. = PURCHASE POWER

1/ WEIGHTED AVERAGE RATE OF INTEREST BY INVESTMENT

2/ INTEREST RATE REFLECTS PARTIAL YEAR

INTEREST CALCULATION FOR FY 2031

TRANSMISSION FY 2003

REPAYMENT STUDY FOR TRANSMISSION INITIAL PROPOSAL 2002 RA

(ALL AMOUNTS IN \$1000)

PROJECT	TYPE	PRINCIPAL	RATE 1/	INTEREST	PREMIUM	TOTAL
BPA PROGRAM	HISTORICAL NEW 2/	4,017,947 196,977	X .06884 X .03445	= 276,584 = 6,786	847	284,217
AFUDC						0
INTEREST INCOME	(REVENUE - A.O. - P.P. - BOND INT.) X RATE X 0.5					-8,201
	( 365,608 - 0 - -1,674 - 139,987) X .03608					----- 276,016

0A.O. = ANNUAL OBLIGATIONS - CORPS/BUREAU O &amp; M

P.P. = PURCHASE POWER

1/ WEIGHTED AVERAGE RATE OF INTEREST BY INVESTMENT

2/ INTEREST RATE REFLECTS PARTIAL YEAR

INTEREST CALCULATION FOR FY 2032

TRANSMISSION FY 2003

REPAYMENT STUDY FOR TRANSMISSION INITIAL PROPOSAL 2002 RA

(ALL AMOUNTS IN \$1000)

PROJECT	TYPE	PRINCIPAL	RATE 1/	INTEREST	PREMIUM	TOTAL
BPA PROGRAM	HISTORICAL NEW 2/	4,123,658 198,732	X .06885 X .03445	= 283,912 = 6,846	146	290,904
AFUDC						290,904
INTEREST INCOME	(REVENUE - A.O. - P.P. - BOND INT.) X RATE X 0.5					-8,068
	( 365,608 - 0 - -1,685 - 143,668) X .03608					----- 282,836

0A.O. = ANNUAL OBLIGATIONS - CORPS/BUREAU O &amp; M

P.P. = PURCHASE POWER

1/ WEIGHTED AVERAGE RATE OF INTEREST BY INVESTMENT

2/ INTEREST RATE REFLECTS PARTIAL YEAR

INTEREST CALCULATION FOR FY 2033

TRANSMISSION FY 2003

REPAYMENT STUDY FOR TRANSMISSION INITIAL PROPOSAL 2002 RA

(ALL AMOUNTS IN \$1000)

PROJECT	TYPE	PRINCIPAL	RATE 1/	INTEREST	PREMIUM	TOTAL
BPA PROGRAM	HISTORICAL NEW 2/	4,237,933 200,499	X .06889 X .03445	= 291,938 = 6,907	254	299,099
AFUDC						0
INTEREST INCOME	(REVENUE - A.O. - P.P. - BOND INT.) X RATE X 0.5					-7,923
	( 365,608 - 0 - -1,696 - 147,696) X .03608					----- 291,176

0A.O. = ANNUAL OBLIGATIONS - CORPS/BUREAU O &amp; M

P.P. = PURCHASE POWER

1/ WEIGHTED AVERAGE RATE OF INTEREST BY INVESTMENT

2/ INTEREST RATE REFLECTS PARTIAL YEAR

INTEREST CALCULATION FOR FY 2034

TRANSMISSION FY 2003

REPAYMENT STUDY FOR TRANSMISSION INITIAL PROPOSAL 2002 RA

(ALL AMOUNTS IN \$1000)

PROJECT	TYPE	PRINCIPAL	RATE 1/	INTEREST	PREMIUM	TOTAL
BPA PROGRAM	HISTORICAL NEW 2/	4,362,304 202,283	X .06889 X .03445	= 300,537 = 6,969	127	307,633
AFUDC						0
INTEREST INCOME	(REVENUE - A.O. - P.P. - BOND INT.) X RATE X 0.5					-7,768
	( 365,608 - 0 - -1,706 - 152,009) X .03608					----- 299,865
NET						

0A.O. = ANNUAL OBLIGATIONS - CORPS/BUREAU O &amp; M

P.P. = PURCHASE POWER

1/ WEIGHTED AVERAGE RATE OF INTEREST BY INVESTMENT

2/ INTEREST RATE REFLECTS PARTIAL YEAR

INTEREST CALCULATION FOR FY 2035

TRANSMISSION FY 2003

REPAYMENT STUDY FOR TRANSMISSION INITIAL PROPOSAL 2002 RA

(ALL AMOUNTS IN \$1000)

PROJECT	TYPE	PRINCIPAL	RATE 1/	INTEREST	PREMIUM	TOTAL
BPA PROGRAM	HISTORICAL NEW 2/	4,497,138 203,993	X .06890 X .03445	= 309,852 = 7,028	408	317,288
AFUDC						317,288
INTEREST INCOME	(REVENUE - A.O. - P.P. - BOND INT.) X RATE X 0.5					-7,600
	( 365,608 - 0 - -1,715 - 156,682) X .03608					----- 309,688

0A.O. = ANNUAL OBLIGATIONS - CORPS/BUREAU O &amp; M

P.P. = PURCHASE POWER

1/ WEIGHTED AVERAGE RATE OF INTEREST BY INVESTMENT

2/ INTEREST RATE REFLECTS PARTIAL YEAR

INTEREST CALCULATION FOR FY 2036

TRANSMISSION FY 2003

REPAYMENT STUDY FOR TRANSMISSION INITIAL PROPOSAL 2002 RA

(ALL AMOUNTS IN \$1000)

PROJECT	TYPE	PRINCIPAL	RATE 1/	INTEREST	PREMIUM	TOTAL
BPA PROGRAM	HISTORICAL NEW 2/	4,643,496 205,585	X .06890 X .03445	= 319,936 = 7,082	257	327,275
AFUDC						327,275
INTEREST INCOME	(REVENUE - A.O. - P.P. - BOND INT.) X RATE X 0.5					-7,418
	( 365,608 - 0 - -1,721 - 161,739) X .03608					-----
NET						319,857

0A.O. = ANNUAL OBLIGATIONS - CORPS/BUREAU O &amp; M

P.P. = PURCHASE POWER

1/ WEIGHTED AVERAGE RATE OF INTEREST BY INVESTMENT

2/ INTEREST RATE REFLECTS PARTIAL YEAR

INTEREST CALCULATION FOR FY 2037

TRANSMISSION FY 2003

REPAYMENT STUDY FOR TRANSMISSION INITIAL PROPOSAL 2002 RA

(ALL AMOUNTS IN \$1000)

PROJECT	TYPE	PRINCIPAL	RATE 1/	INTEREST	PREMIUM	TOTAL
BPA PROGRAM	HISTORICAL NEW 2/	4,801,609 207,045	X .06890 X .03445	= 330,830 = 7,133	144	
						338,107
						-----
						338,107
AFUDC						0
INTEREST INCOME	(REVENUE - A.O. - P.P. - BOND INT.) X RATE X 0.5					-7,221
	( 365,608 - 0 - -1,727 - 167,198 ) X .03608					-----
NET						330,886

0A.O. = ANNUAL OBLIGATIONS - CORPS/BUREAU O &amp; M

P.P. = PURCHASE POWER

1/ WEIGHTED AVERAGE RATE OF INTEREST BY INVESTMENT

2/ INTEREST RATE REFLECTS PARTIAL YEAR

INTEREST CALCULATION FOR FY 2038

TRANSMISSION FY 2003

REPAYMENT STUDY FOR TRANSMISSION INITIAL PROPOSAL 2002 RA

(ALL AMOUNTS IN \$1000)

PROJECT	TYPE	PRINCIPAL	RATE 1/	INTEREST	PREMIUM	TOTAL
BPA PROGRAM	HISTORICAL NEW 2/	4,972,205 208,379	X .06890 X .03445	= 342,584 = 7,179	51	349,814
						----- 349,814
AFUDC						0
INTEREST INCOME	(REVENUE - A.O. - P.P. - BOND INT.) X RATE X 0.5					-7,009
	( 365,608 - 0 - -1,732 - 173,087) X .03608					-----
NET						342,805
0 GRAND TOTAL						9,418,765

0A.O. = ANNUAL OBLIGATIONS - CORPS/BUREAU O &amp; M

P.P. = PURCHASE POWER

1/ WEIGHTED AVERAGE RATE OF INTEREST BY INVESTMENT

2/ INTEREST RATE REFLECTS PARTIAL YEAR

**Summary of Interest Expense  
Transmission  
FY 2003 Current Repayment Study**

## SUMMARY OF INTEREST EXPENSE

## TRANSMISSION FY 2003

## REPAYMENT STUDY FOR TRANSMISSION INITIAL PROPOSAL 2002 RA

(ALL AMOUNTS IN \$1000)

2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
------	------	------	------	------	------	------	------	------	------

## BUREAU OF RECLAMATION

BOISE  
 COLUMBIA BASIN  
 COLUMBIA BASIN- 3RD  
 HUNGRY HORSE  
 MINIDOKA  
 YAKIMA-CHANDLER  
 YAKIMA-ROZA

## TOTAL BUREAU

## CORPS OF ENGINEERS

ALBENI FALLS  
 BONNEVILLE  
 BONNEVILLE - 2ND POW  
 CHIEF JOSEPH  
 COUGAR  
 COLUMBIA RIVER FISH  
 DETROIT-BIG CLIFF  
 DWORSHAK  
 GREEN PETER-FOSTER  
 HILLS CREEK  
 ICE HARBOR  
 JOHN DAY  
 LIBBY  
 LITTLE GOOSE  
 LOOKOUT POINT-DEXTER  
 LOST CREEK  
 LOWER GRANITE  
 LOWER MONUMENTAL  
 MCNARY  
 STRUBE  
 THE DALLES

## TOTAL CORPS

## LOWER SNAKE F AND W

BONNEVILLE POWER ADM	71,508	70,044	66,904	65,280	63,484	59,261	58,721	57,627	55,919	55,154
TOTAL APPROPRIATIONS	71,508	70,044	66,904	65,280	63,484	59,261	58,721	57,627	55,919	55,154

## BPA BORROWING

BPA PROGRAM	118,536	127,923	142,392	149,339	154,058	157,347	157,040	157,326	158,844	160,433
BUREAU DIRECT FUND										
FISH, WILDLIFE & ENV	4,361	5,384	6,002	6,605	6,907	6,907	6,907	6,907	6,907	6,907
PREMIUMS	24	822	5,185	1,836	1,918	3,986	4,035	1,108	1,604	1,794
LESS										
0 AFUDC										
0 INTEREST INCOME	8,847	6,976	10,453	10,586	10,368	10,311	10,318	10,315	10,290	10,263
0 TOTAL BPA BORROWING	114,074	127,153	143,126	147,194	152,515	157,929	157,664	155,026	157,065	158,871
TOTALS	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	185,582	197,197	210,030	212,474	215,999	217,190	216,385	212,653	212,984	214,025

## SUMMARY OF INTEREST EXPENSE

## TRANSMISSION FY 2003

## REPAYMENT STUDY FOR TRANSMISSION INITIAL PROPOSAL 2002 RA

(ALL AMOUNTS IN \$1000)

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
--	------	------	------	------	------	------	------	------	------	------

## BUREAU OF RECLAMATION

BOISE  
 COLUMBIA BASIN  
 COLUMBIA BASIN- 3RD  
 HUNGRY HORSE  
 MINIDOKA  
 YAKIMA-CHANDLER  
 YAKIMA-ROZA

## TOTAL BUREAU

## CORPS OF ENGINEERS

ALBENI FALLS  
 BONNEVILLE  
 BONNEVILLE - 2ND POW  
 CHIEF JOSEPH  
 COUGAR  
 COLUMBIA RIVER FISH  
 DETROIT-BIG CLIFF  
 DWORSHAK  
 GREEN PETER-FOSTER  
 HILLS CREEK  
 ICE HARBOR  
 JOHN DAY  
 LIBBY  
 LITTLE GOOSE  
 LOOKOUT POINT-DEXTER  
 LOST CREEK  
 LOWER GRANITE  
 LOWER MONUMENTAL  
 MCNARY  
 STRUBE  
 THE DALLES

## TOTAL CORPS

## LOWER SNAKE F AND W

BONNEVILLE POWER ADM	51,725	41,429	33,147	24,897	13,773	6,996
TOTAL APPROPRIATIONS	51,725	41,429	33,147	24,897	13,773	6,996

## BPA BORROWING

BPA PROGRAM	164,250	175,035	183,475	194,531	205,727	213,530	222,508	224,168	226,271	228,697
BUREAU DIRECT FUND										
FISH, WILDLIFE & ENV	6,907	6,036	6,036	3,256	3,256	3,256	1,837	1,208	603	
PREMIUMS						1,512	5,711	5,489	5,105	3,590
LESS										
0 AFUDC										
0 INTEREST INCOME	10,196	10,019	9,868	9,720	9,520	9,381	9,246	9,229	9,203	9,172
0 TOTAL BPA BORROWING	160,961	171,052	179,643	188,067	199,463	208,917	220,810	221,636	222,776	223,115
TOTALS	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	212,686	212,481	212,790	212,964	213,236	215,913	220,810	221,636	222,776	223,115

## SUMMARY OF INTEREST EXPENSE

## TRANSMISSION FY 2003

## REPAYMENT STUDY FOR TRANSMISSION INITIAL PROPOSAL 2002 RA

(ALL AMOUNTS IN \$1000)

	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
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## BUREAU OF RECLAMATION

BOISE  
 COLUMBIA BASIN  
 COLUMBIA BASIN- 3RD  
 HUNGRY HORSE  
 MINIDOKA  
 YAKIMA-CHANDLER  
 YAKIMA-ROZA

## TOTAL BUREAU

## CORPS OF ENGINEERS

ALBENI FALLS  
 BONNEVILLE  
 BONNEVILLE - 2ND POW  
 CHIEF JOSEPH  
 COUGAR  
 COLUMBIA RIVER FISH  
 DETROIT-BIG CLIFF  
 DWORSHAK  
 GREEN PETER-FOSTER  
 HILLS CREEK  
 ICE HARBOR  
 JOHN DAY  
 LIBBY  
 LITTLE GOOSE  
 LOOKOUT POINT-DEXTER  
 LOST CREEK  
 LOWER GRANITE  
 LOWER MONUMENTAL  
 MCNARY  
 STRUBE  
 THE DALLES

## TOTAL CORPS

LOWER SNAKE F AND W

BONNEVILLE POWER ADM

TOTAL APPROPRIATIONS

BPA BORROWING

BPA PROGRAM	230,796	233,487	236,522	239,897	244,424	248,565	253,092	258,028	263,390	270,090
BUREAU DIRECT FUND										
FISH, WILDLIFE & ENV										
PREMIUMS	6,018	6,057	5,920	1,226	5,411	5,215	4,985	2,800		4,020
LESS										
0 AFUDC										
0 INTEREST INCOME	9,136	9,089	9,035	8,976	8,895	8,822	8,741	8,654	8,558	8,438
0 TOTAL BPA BORROWING	227,678	230,455	233,407	232,147	240,940	244,958	249,336	252,174	254,832	265,672
TOTALS	227,678	230,455	233,407	232,147	240,940	244,958	249,336	252,174	254,832	265,672

## SUMMARY OF INTEREST EXPENSE

## TRANSMISSION FY 2003

## REPAYMENT STUDY FOR TRANSMISSION INITIAL PROPOSAL 2002 RA

(ALL AMOUNTS IN \$1000)

2030      2031      2032      2033      2034      2035      2036      2037      2038

## BUREAU OF RECLAMATION

BOISE  
COLUMBIA BASIN  
COLUMBIA BASIN- 3RD  
HUNGRY HORSE  
MINIDOKA  
YAKIMA-CHANDLER  
YAKIMA-ROZA

## TOTAL BUREAU

## CORPS OF ENGINEERS

ALBENI FALLS  
BONNEVILLE  
BONNEVILLE - 2ND POW  
CHIEF JOSEPH  
COUGAR  
COLUMBIA RIVER FISH  
DETROIT-BIG CLIFF  
DWORSHAK  
GREEN PETER-FOSTER  
HILLS CREEK  
ICE HARBOR  
JOHN DAY  
LIBBY  
LITTLE GOOSE  
LOOKOUT POINT-DEXTER  
LOST CREEK  
LOWER GRANITE  
LOWER MONUMENTAL  
MCNARY  
STRUBE  
THE DALLES

## TOTAL CORPS

## LOWER SNAKE F AND W

## BONNEVILLE POWER ADM

## TOTAL APPROPRIATIONS

BPA BORROWING

BPA PROGRAM	276,484	283,370	290,758	298,845	307,506	316,880	327,018	337,963	349,763
BUREAU DIRECT FUND									
FISH, WILDLIFE & ENV									
PREMIUMS	2,951	847	146	254	127	408	257	144	51
LESS									
0 AFUDC									
0 INTEREST INCOME	8,324	8,201	8,068	7,923	7,768	7,600	7,418	7,221	7,009
0TOTAL BPA BORROWING	271,111	276,016	282,836	291,176	299,865	309,688	319,857	330,886	342,805
TOTALS	271,111	276,016	282,836	291,176	299,865	309,688	319,857	330,886	342,805

SUMMARY OF INTEREST EXPENSE

TRANSMISSION FY 2003

REPAYMENT STUDY FOR TRANSMISSION INITIAL PROPOSAL 2002 RA

TOTALS

BUREAU OF RECLAMATION

BOISE  
COLUMBIA BASIN  
COLUMBIA BASIN- 3RD  
HUNGRY HORSE  
MINIDOKA  
YAKIMA-CHANDLER  
YAKIMA-ROZA

TOTAL BUREAU

CORPS OF ENGINEERS

ALBENI FALLS  
BONNEVILLE  
BONNEVILLE - 2ND POW  
CHIEF JOSEPH  
COUGAR  
COLUMBIA RIVER FISH  
DETROIT-BIG CLIFF  
DWORSHAK  
GREEN PETER-FOSTER  
HILLS CREEK  
ICE HARBOR  
JOHN DAY  
LIBBY  
LITTLE GOOSE  
LOOKOUT POINT-DEXTER  
LOST CREEK  
LOWER GRANITE  
LOWER MONUMENTAL  
MCNARY  
STRUBE  
THE DALLES

TOTAL CORPS  
LOWER SNAKE F AND W

TOTAL APPROPRIATIONS

BONNEVILLE POWER ADM 795,869

BPA BORROWING

BPA PROGRAM 8,788,308

BUREAU DIRECT FUND	
FISH, WILDLIFE & ENV	96,189
PREMIUMS	90,556
0LESS	
0 AFUDC	
0 INTEREST INCOME	352,157
0TOTAL BPA BORROWING	8,622,896
	-----
TOTALS	9,418,765



**Application of Amortization  
Transmission  
FY 2003 Current Repayment Study**

## APPLICATION OF AMORTIZATION

## TRANSMISSION FY 2003

## REPAYMENT STUDY FOR TRANSMISSION INITIAL PROPOSAL 2002 RA

YEAR

INVESTMENT PAID

(ALL AMOUNT IN \$1000)

	PROJECT	IN-SERVICE	DUE	GROSS	NET	RATE	REPLACEMENT	AMOUNT
2000	BPA PROGRAM	1992	2000	92,125	92,125	.06600		92,125
	BONNEVILLE POWER ADMINISTRATION	1955	2000	11,827	11,827	.06620		11,827
	BONNEVILLE POWER ADMINISTRATION	1955	2000	10,283	10,283	.06620	R	10,283
	BPA PROGRAM	1990	2030	1,149	1,149	.09250		352
	TOTAL							114,587
2001	BONNEVILLE POWER ADMINISTRATION	1956	2001	14,573	14,573	.06710		14,573
	BONNEVILLE POWER ADMINISTRATION	1956	2001	32,221	32,221	.06710	R	32,221
	BPA PROGRAM	1990	2030	1,149	797	.09250		797
	BPA PROGRAM	1990	2030	3,824	3,824	.09250	R	3,824
	BPA PROGRAM	1990	2030	41,894	41,894	.09250		7,649
	TOTAL							59,064
2002	BONNEVILLE POWER ADMINISTRATION	1957	2002	7,933	7,933	.06790		7,933
	BPA PROGRAM	1999	2002	40,000	40,000	.06200		40,000
	BONNEVILLE POWER ADMINISTRATION	1957	2002	15,980	15,980	.06790	R	15,980
	BPA PROGRAM	1990	2030	41,894	34,245	.09250		34,245
	BPA PROGRAM	1990	2030	29	29	.09250		29
	BPA PROGRAM	1990	2030	96	96	.09250	R	96
	BPA PROGRAM	1990	2030	3,008	3,008	.09250		3,008
	BPA PROGRAM	1995	2025	41,491	41,491	.07700		41,491
	BPA PROGRAM	1995	2025	65,000	65,000	.07700		5,357
	TOTAL							148,139
2003	BPA PROGRAM	1996	2003	50,000	50,000	.05900		50,000
	BPA PROGRAM	1996	2003	4,378	4,378	.05900		4,378
	BPA PROGRAM	2000	2003	40,000	40,000	.06400		40,000
	BONNEVILLE POWER ADMINISTRATION	1958	2003	15,593	15,593	.06840		15,593
	BONNEVILLE POWER ADMINISTRATION	1958	2003	10,654	10,654	.06840	R	10,654
	BPA PROGRAM	1995	2025	65,000	59,643	.07700		32,509
	TOTAL							153,134

## APPLICATION OF AMORTIZATION                    TRANSMISSION FY 2003                    REPAYMENT STUDY FOR TRANSMISSION INITIAL PROPOSAL 2002 RA

YEAR	INVESTMENT PAID-----							
	(ALL AMOUNT IN \$1000)							
	PROJECT	IN-SERVICE	DUEDUE	GROSS	NET	RATE	REPLACEMENT	AMOUNT
2004	BPA PROGRAM	1999	2004	26,200	26,200	.05950		26,200
	BPA PROGRAM	1997	2004	30,000	30,000	.06800		30,000
	BONNEVILLE POWER ADMINISTRATION	1959	2004	8,157	8,157	.06880		8,157
	BONNEVILLE POWER ADMINISTRATION	1959	2004	8,863	8,863	.06880	R	8,863
	BPA PROGRAM	1995	2025	65,000	27,134	.07700		27,134
	BPA PROGRAM	1995	2025	8,442	8,442	.07700		8,442
	BONNEVILLE POWER ADMINISTRATION	1971	2016	17,805	17,805	.07290	R	17,805
	BONNEVILLE POWER ADMINISTRATION	1971	2016	12,051	12,051	.07290		12,051
	BONNEVILLE POWER ADMINISTRATION	1971	2016	17,766	17,766	.07290	R	11,998
	TOTAL							150,650
2005	BPA PROGRAM	1997	2005	80,000	80,000	.06900		80,000
	BONNEVILLE POWER ADMINISTRATION	1960	2005	3,598	3,598	.06910		3,598
	BONNEVILLE POWER ADMINISTRATION	1960	2005	4,218	4,218	.06910	R	4,218
	BPA PROGRAM	2000	2035	189,593	189,593	.07540		61,675
	TOTAL							149,491
2006	BPA PROGRAM	1996	2006	70,000	70,000	.07050		70,000
	BONNEVILLE POWER ADMINISTRATION	1961	2006	4,468	4,468	.06950		4,468
	BONNEVILLE POWER ADMINISTRATION	1961	2006	11,271	11,271	.06950	R	11,271
	BPA PROGRAM	2000	2035	189,593	127,918	.07540		64,588
	TOTAL							150,327
2007	BPA PROGRAM	1997	2007	111,254	111,254	.06650		111,254
	BONNEVILLE POWER ADMINISTRATION	1962	2007	19,597	19,597	.06980		19,597
	BONNEVILLE POWER ADMINISTRATION	1962	2007	4,877	4,877	.06980	R	4,877
	BPA PROGRAM	2000	2035	189,593	63,330	.07540		18,361
	TOTAL							154,089
2008	BPA PROGRAM	1998	2008	40,000	40,000	.05750		40,000
	BPA PROGRAM	1998	2008	75,300	75,300	.06000		75,300
	BONNEVILLE POWER ADMINISTRATION	1963	2008	904	904	.07020		904
	BONNEVILLE POWER ADMINISTRATION	1963	2008	803	803	.07020	R	803
	BONNEVILLE POWER ADMINISTRATION	1963	2008	4,876	4,876	.07020		4,876
	BONNEVILLE POWER ADMINISTRATION	1963	2008	4,330	4,330	.07020	R	4,330
	BPA PROGRAM	2000	2035	189,593	44,969	.07540		27,575
	TOTAL							153,788

## APPLICATION OF AMORTIZATION

## TRANSMISSION FY 2003

## REPAYMENT STUDY FOR TRANSMISSION INITIAL PROPOSAL 2002 RA

YEAR

INVESTMENT PAID

(ALL AMOUNT IN \$1000)

	PROJECT	IN-SERVICE	DUEDUE	GROSS	NET	RATE	REPLACEMENT	AMOUNT
2009	BONNEVILLE POWER ADMINISTRATION	1964	2009	4,151	4,151	.07060		4,151
	BPA PROGRAM	1998	2009	72,700	72,700	.06000		72,700
	BONNEVILLE POWER ADMINISTRATION	1964	2009	5,738	5,738	.07060	R	5,738
	BPA PROGRAM	2000	2035	189,593	17,394	.07540		17,394
	BPA PROGRAM	2000	2031	15,323	15,323	.07540		15,323
	BONNEVILLE POWER ADMINISTRATION	1971	2016	17,766	5,768	.07290	R	5,768
	BONNEVILLE POWER ADMINISTRATION	1971	2016	12,025	12,025	.07290		12,025
	BONNEVILLE POWER ADMINISTRATION	1972	2017	2,873	2,873	.07290	R	2,873
	BONNEVILLE POWER ADMINISTRATION	1972	2017	3,980	3,980	.07290		3,980
	BONNEVILLE POWER ADMINISTRATION	1972	2017	21,170	21,170	.07290	R	12,824
								-----
								152,776
2010	FISH, WILDLIFE & ENVIRONMENTAL	1995	2010	12,100	12,100	.07200		12,100
	BONNEVILLE POWER ADMINISTRATION	1965	2010	3,706	3,706	.07090		3,706
	BONNEVILLE POWER ADMINISTRATION	1965	2010	7,248	7,248	.07090	R	7,248
	BONNEVILLE POWER ADMINISTRATION	1965	2010	5,202	5,202	.07090		5,202
	BONNEVILLE POWER ADMINISTRATION	1965	2010	10,171	10,171	.07090	R	10,171
	BONNEVILLE POWER ADMINISTRATION	1972	2017	21,170	8,346	.07290	R	8,346
	BONNEVILLE POWER ADMINISTRATION	1972	2017	29,326	29,326	.07290		29,326
	BONNEVILLE POWER ADMINISTRATION	1973	2018	10,491	10,491	.07280	R	10,491
	BONNEVILLE POWER ADMINISTRATION	1973	2018	16,368	16,368	.07280		16,368
	BONNEVILLE POWER ADMINISTRATION	1973	2018	21,656	21,656	.07280	R	21,656
	BONNEVILLE POWER ADMINISTRATION	1973	2018	33,788	33,788	.07280		29,529
								154,143
2011	BONNEVILLE POWER ADMINISTRATION	1966	2011	11,830	11,830	.07130		11,830
	BPA PROGRAM	1998	2011	40,000	40,000	.06200		40,000
	BONNEVILLE POWER ADMINISTRATION	1966	2011	6,647	6,647	.07130		6,647
	BONNEVILLE POWER ADMINISTRATION	1966	2011	1,714	1,714	.07130	R	1,714
	BONNEVILLE POWER ADMINISTRATION	1966	2011	3,049	3,049	.07130	R	3,049
	BONNEVILLE POWER ADMINISTRATION	1973	2018	33,788	4,259	.07280		4,259
	BONNEVILLE POWER ADMINISTRATION	1970	2015	3,003	3,003	.07270	R	3,003
	BONNEVILLE POWER ADMINISTRATION	1970	2015	24,412	24,412	.07270		24,412
	BONNEVILLE POWER ADMINISTRATION	1970	2015	7,995	7,995	.07270	R	7,995
	BONNEVILLE POWER ADMINISTRATION	1970	2015	64,977	64,977	.07270		51,467
								-----
								154,376

TOTAL

## APPLICATION OF AMORTIZATION

## TRANSMISSION FY 2003

## REPAYMENT STUDY FOR TRANSMISSION INITIAL PROPOSAL 2002 RA

YEAR

INVESTMENT PAID

(ALL AMOUNT IN \$1000)

	PROJECT	IN-SERVICE	DUE	GROSS	NET	RATE	REPLACEMENT	AMOUNT	
2012	BONNEVILLE POWER ADMINISTRATION	1967	2012	19,003	19,003	.07160	R	19,003	
	BONNEVILLE POWER ADMINISTRATION	1967	2012	4,566	4,566	.07160		4,566	
	BONNEVILLE POWER ADMINISTRATION	1967	2012	14,300	14,300	.07160		14,300	
	BONNEVILLE POWER ADMINISTRATION	1967	2012	3,436	3,436	.07160		3,436	
	FISH, WILDLIFE & ENVIRONMENTAL	1997	2012	40,000	40,000	.06950		40,000	
	BONNEVILLE POWER ADMINISTRATION	1970	2015	64,977	13,510	.07270		13,510	
	BONNEVILLE POWER ADMINISTRATION	1974	2019	12,563	12,563	.07270		12,563	
	BONNEVILLE POWER ADMINISTRATION	1974	2019	21,826	21,826	.07270		21,826	
	BONNEVILLE POWER ADMINISTRATION	1974	2019	12,079	12,079	.07270		12,079	
	BONNEVILLE POWER ADMINISTRATION	1974	2019	20,984	20,984	.07270		20,984	
<hr/>									
								154,095	
2013	TOTAL								
	BONNEVILLE POWER ADMINISTRATION	1968	2013	41,070	41,070	.07200	R	41,070	
	BONNEVILLE POWER ADMINISTRATION	1968	2013	8,076	8,076	.07200		8,076	
	BONNEVILLE POWER ADMINISTRATION	1968	2013	23,202	23,202	.07200		23,202	
	BONNEVILLE POWER ADMINISTRATION	1968	2013	4,562	4,562	.07200		4,562	
	BONNEVILLE POWER ADMINISTRATION	1974	2019	20,984	8,172	.07270		8,172	
	BONNEVILLE POWER ADMINISTRATION	1975	2020	21,916	21,916	.07250		21,916	
	BONNEVILLE POWER ADMINISTRATION	1975	2020	17,158	17,158	.07250		17,158	
<hr/>									
								153,947	
2014	TOTAL								
	BONNEVILLE POWER ADMINISTRATION	1969	2014	384	384	.07230	R	384	
	BPA PROGRAM	1999	2014	60,000	60,000	.05900		60,000	
	BONNEVILLE POWER ADMINISTRATION	1969	2014	205	205	.07230		205	
	BONNEVILLE POWER ADMINISTRATION	1969	2014	42,237	42,237	.07230		42,237	
	BONNEVILLE POWER ADMINISTRATION	1969	2014	22,537	22,537	.07230		22,537	
	BONNEVILLE POWER ADMINISTRATION	1975	2020	32,026	2,235	.07250		2,235	
	BONNEVILLE POWER ADMINISTRATION	1975	2020	11,742	11,742	.07250		11,742	
	BONNEVILLE POWER ADMINISTRATION	1976	2021	61,025	61,025	.07230		14,361	
<hr/>									
								153,701	

## APPLICATION OF AMORTIZATION TRANSMISSION FY 2003 REPAYMENT STUDY FOR TRANSMISSION INITIAL PROPOSAL 2002 RA

YEAR	INVESTMENT PAID						
	(ALL AMOUNT IN \$1000)						
PROJECT	IN-SERVICE	DUEDUE	GROSS	NET	RATE	REPLACEMENT	AMOUNT
2015	FISH, WILDLIFE & ENVIRONMENTAL	2000	2015	19,603	19,603	.07240	19,603
	BONNEVILLE POWER ADMINISTRATION	1976	2021	61,025	46,664	.07230	46,664
	BONNEVILLE POWER ADMINISTRATION	1976	2021	2,212	2,212	.07230	2,212
	BONNEVILLE POWER ADMINISTRATION	1977	2022	4,981	4,981	.07210	4,981
	BONNEVILLE POWER ADMINISTRATION	1977	2022	33,702	33,702	.07210	33,702
	BONNEVILLE POWER ADMINISTRATION	1977	2022	5,380	5,380	.07210	5,380
	BONNEVILLE POWER ADMINISTRATION	1977	2022	3,948	3,948	.07210	3,948
	BPA PROGRAM	2001	2036	201,604	201,604	.07290	34,560
	TOTAL						151,050
2016	FISH, WILDLIFE & ENVIRONMENTAL	2001	2016	9,086	9,086	.06920	9,086
	BPA PROGRAM	2001	2036	201,604	167,044	.07290	137,092
	TOTAL						146,178
2017	FISH, WILDLIFE & ENVIRONMENTAL	2002	2017	9,047	9,047	.06690	9,047
	BPA PROGRAM	2001	2036	201,604	29,952	.07290	29,952
	BPA PROGRAM	2002	2037	233,185	233,185	.07080	106,377
	TOTAL						145,376
2018	FISH, WILDLIFE & ENVIRONMENTAL	2003	2018	9,274	9,274	.06500	9,274
	BPA PROGRAM	2002	2037	233,185	126,808	.07080	126,808
	BPA PROGRAM	1994	2034	50,000	50,000	.07050	8,178
	TOTAL						144,260
2019	BPA PROGRAM	1994	2034	50,000	41,822	.07050	41,822
	BPA PROGRAM	1993	2033	110,000	110,000	.06950	102,122
	TOTAL						143,944
2020	BPA PROGRAM	1993	2033	110,000	7,878	.06950	7,878
	BPA PROGRAM	2004	2049	137,969	137,969	.06890	R 131,526
	TOTAL						139,404

## APPLICATION OF AMORTIZATION TRANSMISSION FY 2003 REPAYMENT STUDY FOR TRANSMISSION INITIAL PROPOSAL 2002 RA

YEAR	INVESTMENT PAID							
	(ALL AMOUNT IN \$1000)							
	PROJECT	IN-SERVICE	DUE	GROSS	NET	RATE	REPLACEMENT	AMOUNT
2021	BPA PROGRAM	2004	2049	137,969	6,443	.06890	R	6,443
	BPA PROGRAM	2005	2050	141,467	141,467	.06890	R	130,206
	TOTAL							136,649
2022	BPA PROGRAM	2005	2050	141,467	11,261	.06890	R	11,261
	BPA PROGRAM	2006	2051	144,854	144,854	.06890	R	122,457
	TOTAL							133,718
2023	BPA PROGRAM	1998	2023	106,600	106,600	.05850		106,600
	BPA PROGRAM	2006	2051	144,854	22,397	.06890	R	22,397
	BPA PROGRAM	2007	2052	148,057	148,057	.06890	R	6,002
	TOTAL							134,999
2024	BPA PROGRAM	2007	2052	148,057	142,055	.06890	R	126,225
	TOTAL							126,225
2025	BPA PROGRAM	2007	2052	148,057	15,830	.06890	R	15,830
	BPA PROGRAM	2008	2053	150,933	150,933	.06890	R	106,396
	TOTAL							122,226
2026	BPA PROGRAM	2008	2053	150,933	44,537	.06890	R	44,537
	BPA PROGRAM	2009	2054	153,462	153,462	.06890	R	73,329
	TOTAL							117,866
2027	BPA PROGRAM	2009	2054	153,462	80,133	.06890	R	65,045
	BPA PROGRAM	1998	2028	50,000	50,000	.06650		50,000
	TOTAL							115,045
2028	BPA PROGRAM	1998	2028	112,400	112,400	.05850		112,400
	BPA PROGRAM	2009	2054	153,462	15,088	.06890	R	5
	TOTAL							112,405

	APPLICATION OF AMORTIZATION		TRANSMISSION FY 2003		REPAYMENT STUDY FOR TRANSMISSION INITIAL PROPOSAL 2002 RA									
YEAR	INVESTMENT PAID-----													
	(ALL AMOUNT IN \$1000)													
	PROJECT	IN-SERVICE	DUEDUE	GROSS	NET	RATERATE	REPLACEMENT	AMOUNT						
2029	BPA PROGRAM	2009	2054	153,462	15,083	.06890	R	15,083						
	BPA PROGRAM	2010	2055	155,555	155,555	.06890	R	86,497						
	TOTAL							101,580						
2030	BPA PROGRAM	2010	2055	155,555	69,058	.06890	R	63,762						
	BPA PROGRAM	2003	2038	239,131	239,131	.06890		32,394						
	TOTAL							96,156						
2031	BPA PROGRAM	2010	2055	155,555	5,296	.06890	R	42						
	BPA PROGRAM	2003	2038	239,131	206,737	.06890		50,302						
	BPA PROGRAM	1994	2034	50,000	50,000	.06850		22,330						
	BPA PROGRAM	1998	2032	98,900	98,900	.06700		18,592						
	TOTAL							91,266						
2032	BPA PROGRAM	1998	2032	98,900	80,308	.06700	R	80,308						
	BPA PROGRAM	2010	2055	155,555	5,254	.06890		4,149						
	TOTAL							84,457						
2033	BPA PROGRAM	2010	2055	155,555	1,105	.06890	R	1,105						
	BPA PROGRAM	2011	2056	157,500	157,500	.06890	R	2,643						
	BPA PROGRAM	1994	2034	50,000	27,670	.06850		27,670						
	BPA PROGRAM	1994	2034	108,400	108,400	.06850		44,710						
	TOTAL							76,128						
2034	BPA PROGRAM	1994	2034	108,400	63,690	.06850	R	63,690						
	BPA PROGRAM	2011	2056	157,500	154,857	.06890		3,759						
	TOTAL							67,449						
2035	BPA PROGRAM	2011	2056	157,500	151,098	.06890	R	2,572						
	BPA PROGRAM	2003	2038	239,131	156,435	.06890		55,063						
	TOTAL							57,635						

	APPLICATION OF AMORTIZATION	TRANSMISSION FY 2003			REPAYMENT STUDY FOR TRANSMISSION INITIAL PROPOSAL 2002 RA					
YEAR		INVESTMENT PAID-----								
		(ALL AMOUNT IN \$1000)								
	PROJECT	IN-SERVICE	DUE	GROSS	NET	RATE	REPLACEMENT	AMOUNT		
2036	BPA PROGRAM	2011	2056	157,500	148,526	.06890	R	2,608		
	BPA PROGRAM	2003	2038	239,131	101,372	.06890		44,864		
	TOTAL							47,472		
2037	BPA PROGRAM	2011	2056	157,500	145,918	.06890	R	2,640		
	BPA PROGRAM	2003	2038	239,131	56,508	.06890		33,809		
	TOTAL							36,449		
2038	BPA PROGRAM	2003	2038	239,131	22,699	.06890	R	22,699		
	BPA PROGRAM	2011	2056	157,500	143,278	.06890		1,836		
	TOTAL							24,535		
	GRAND TOTAL							4,708,779		
	TOTAL DEFERRAL							0		
	NET							4,708,779		



## **CHAPTER 14**

# **REPAYMENT STUDY THEORY AND OPERATION**

## **Repayment Theory of Operation**

### **Introduction**

The Bonneville Power Administration (BPA) is required to collect revenues sufficient to meet BPA's annual transmission expenses and cover the long-term obligations of the Federal Columbia River Transmission System (FCRTS).

The *Repayment Program* is used to determine whether a given set of annual revenues is sufficient to meet a given set of annual expenses and cover a given set of long-term obligations when applied in accordance with the requirements of Department of Energy (DOE) Order RA 6120.2. The Program is also used to determine by the *minimum* factor future revenues can be multiplied by to obtain a new set of revenues which will be sufficient to recover amortization costs.

The revenues and the expenses of the cost evaluation year will be assigned to all future years. This will have the effect of assigning the net operating revenue of the cost evaluation year to all future years. This has the effect of *levelizing* the long term obligations over all future years.

This discussion presents the basic theory upon which the operation of the Program is based, using a minimum of terms for clarity. The complications, how they are incorporated into the program and the effects they have upon the operation of the Program are discussed.

## **Basic Theory**

Given sets of annual revenues and annual expenses, a set of (annual) net operating revenues can be immediately obtained by subtracting the expenses from the revenues. These net operating revenues will be used for paying interest expenses and amortization payments on the long-term obligations.

Compliance with RA 6120.2 requires satisfying, for each year (i), the equation:

$$(1) \text{ net revenues}(i) = \text{interest expense}(i) + \sum_j \text{payment}(i, j) \quad i = 1, 2, \dots, n$$

Note that for each year the payments have been summed over all obligations.

For each obligation (j) the equation:

$$(2) \sum_{i=1}^k \text{payment}(i, j) \leq \text{principle}(j) \quad j = 1, 2, \dots, m,$$

for all k

must be satisfied. Note that for each obligation the payments have been summed over the years.

This set of equations has too many unknowns (payments on the principle balances) to solve simultaneously. RA 6120.2 requires that "to the extent possible, while still complying with the repayment periods established for each investment, amortization of the investment will be accompanied by application to the highest interest-bearing investment first." A method will be established for "complying with the repayment periods established for each investment" and then the investments will be amortized by "application to the highest-interest-bearing investment first" to the extent that compliance permits.

The first equation above is defined for each year and the payments are summed over the investments. The second equation is defined for each investment and the payments are summed over the years. This suggests that if the first set of equations is summed over the years and the second set of equations is summed over the investments, then it may be possible to eliminate the unknown payments between the two sets of equations:

$$(3) \sum_{i=1}^k \text{net revenues}(i) - \sum_{i=1}^k \text{interest expense}(i) \quad k \text{ is the year the study is working on}$$

$$= \sum_{i=1}^k \sum_j \text{payment}(i, j) \quad k = 1, 2, \dots, n,$$

$$= \sum_j \sum_{i=1}^k \text{payment}(i, j) \quad k = 1, 2, \dots, n,$$

$$= \sum_{\text{due}} \sum_{i=1}^k \text{payment}(i, j) + \sum_{\text{not due}} \sum_{j=1}^k \text{payment}(i, j) \quad k = 1, 2, \dots, n,$$

$$= \sum_{\text{due}} \text{payment}(i, j) + \sum_{\text{not due}} \sum_{j=1}^k \text{payment}(i, j) \quad k = 1, 2, \dots, n.$$

Thus we obtain the *predictor* equation:

$$(4) \sum_{i=1}^k \text{net revenues}(i) - \sum_{i=1}^k \text{interest expense}(i) - \sum_{\text{not due}} \sum_{j=1}^k \text{principle}(j) = \sum_{i=1}^k \sum_{j=1}^k \text{payment}(i, j)$$

$$k = 1, 2, \dots, n.$$

For each of the future years the right-hand side of the above equation represents the amount of the accumulated payments on "not due," i.e., "highest interest" investments. The left side indicates how the amount of payments which can be made on these investments in compliance with RA 6120.2 can be evaluated. If, for some future year, this amount is evaluated as being zero or negative, then this equation implies that no payment can be made on an investment

which is "not due" until a later year and still comply with RA 6120.2. Accordingly, if the amount is evaluated as being zero or negative for any future year, then payments can be made only on "highest interest" investments which come due on or before the first such year.

Thus, a new equation is obtained for each year (k). Payments will be made on the highest interest-bearing investment which permits compliance with sets of equations (1), (2) and (4). The amount paid will be the maximum amount which permits compliance with these three sets of equations.

## **Application**

The fourth set of equations has the problem that a payment made in the current year will affect interest expenses in future years since interest will no longer have to be paid on that portion of the investment. This problem is currently solved by using an iterative approach (i.e., a method of successive approximations). The program initially includes no future interest in evaluating the left-hand side of the fourth set of equations. Consequently, the evaluation of revenues available for "not due" payments will be excessive. As the years are processed and the interest of a given year becomes known, it is used in the fourth set of equations for all later years. The fourth set of equations is thus modified, and the evaluation of revenues available for "not due" payments is reduced. Amortizing some investment on its due date could violate equations of the first and fourth sets; then a negative balance will occur. A second iteration will be necessary.

In the second iteration, the interest payments from the first iteration will be used for future years. Since "not due" payments were excessive in the first iteration, the interest payments of the first iteration will be less than the true interest payments. But they will be more accurate than no interest at all and negative balances will be reduced.

If the revenues are sufficiently high, then with successive iterations the interest expenses will converge and the balances will be reduced to zero. A solution is found.

But, if the revenues are not sufficiently high, then compliance with the fourth set of equations will force payments on high-interest obligations to be delayed into the future. This will cause an increase in the interest charges leaving still less revenues available for the high-interest obligations. With successive iterations, interest expenses will converge and negative balances will increase. No solution is found.

### **Deferral of Annual Expenses**

If a set of revenues determined by a set of basic revenues and an assumed rate change cause deferral of annual expenses in any given year, it is necessary to modify the revenue equation for that year to the form:

$$\text{deferral} + \text{net revenue} = \text{interest expense}$$

and, for one or more later years, to the form:

$$\text{net revenue} = \text{interest expense} + \text{payment on deferral} + \text{amortization}.$$

Any change in the revenue equation will manifest itself in the predictor equation, and equation (4) must be modified accordingly.

These deferrals and payments on deferral are initially assumed to be zero. When their values are actually determined, they are used in equation (4) for future years and they are saved in tables so that in case another iteration is necessary, the deferrals and payments from this iteration can be used in the place of future deferrals and payments for the next iteration.

Historical deferrals are processed similar to other investments with the exception that in accordance with RA 6120.2, they are amortized before any other investment.

### **Calculation of Interest Expense**

Annual interest is computed by applying the applicable interest rate (r) to that portion of the principle (p) which was unpaid at the beginning of the year in accordance with RA 6120.2.

The interest on a new obligation is half this amount as specified.

BPA is authorized to accrue an interest credit on its cash balance as an offset against its interest expense. For lack of more detailed information, the net revenues are assumed to accumulate, at a uniform rate throughout the year, except for the interest paid on the bonds at midyear.

If it were assumed that the half year's interest on new obligations implied that all new obligations came at midyear, then there would never be any mid-year interest on a new bond. It will, instead, be assumed that new bonds have a uniform probability of I/T of coming in at any time of the year, where T is equal to one year. Then the probability that the bond will come in by the time (t) is

$$\int_0^t (1/T)dt = t/T \Big|_{t=0}^{t=T} = t/T.$$

The probability that it will come in by the end of the year T is T/T = 1.

(This result can be seen without calculus. Assume that t and T are expressed in days and the year is not a leap year. By assumption the probability that the bond will come

in on any particular day is  $1/365$ . Thus, the probability that the bond has come in on or before day  $t$  is

$$(t)(1/365) = t/365 = t/T.$$

For example, suppose that we want to find the probability that a given bond came in on or before the 100th day of the year. The desired probability is

$$(100)(1/365) = 100/365 = t/T.$$

The amount of interest that the bond will probably incur during a time interval ( $dt$ ) coming at time  $(t)$  is the probability that the bond has come in multiplied by the amount of interest that the bond would incur in that interval:

$$di = (t/T)rpdt.$$

The amount of interest which will probably be incurred by time  $(t)$  is:

$$i = \int_0^t di = \int_0^t (t/T)rp dt = (t^2/2T) rp \Big|_{t=0}^{t=t} = (t^2/2T) rp.$$

In particular, the amount of interest incurred by midyear ( $T/2$ ) would be  $rpT/8$ ; and the amount incurred by the end of the year would be  $rpT/2$ , which is consistent with RA 6120.2.

(Midyear and end-of-year interest on new bonds can also be derived without calculus.

We will consider the midyear interest first. To compute probable midyear interest on new bonds, note that the probability of the bond issue date being in the first half year is  $1/2$ . If the bond issue date is in the first half year, it will, on the average, accrue interest for half of the first half the first year. Midyear interest on new bonds will be only  $1/2$  of the interest of a full year. Since interest for an entire year is

$$i = rpT,$$

mid-year interest on a new bond will be

$$i = (1/2)^3 rpT = rpT/8.$$

Interest on new bonds for the whole year is

$$i = rpT/2$$

because, on average, the bond will have incurred interest for only half of the year.)

## Premiums and Call Provisions

BPA's current bonds either have a provision that they cannot be redeemed for at least five years and that a premium must be paid if they are redeemed before the due date; a provision that they cannot be redeemed for at least five years and that a premium must be paid if they are redeemed five years before the due date; or, a provision that they can be called within five years without paying a premium. The premium calculation is a fraction of one year's interest which is proportional to the life of the bond. This premium must be included in the revenue equation and, as a consequence, will manifest itself in the predictor equation.

The first method used for incorporating the premiums in the solution method was to save the annual premiums between iterations and use those of the previous iteration to predict the future annual premiums. This resulted in some instability when premiums shifted from one year to another. It resulted in an inability to solve when the revenues were close to the minimum revenues.

The second method was to consider the premium as being the amount which *would be* paid in the current year, but as being "due" when the principle was due. But, since the *would-be* premium decreased each year until actually paid, the predictor equation was adjusted each year to reflect the reduction in the premiums. This tended to introduce an inaccuracy in the predictor equation. Adjustment of the predictor equation for changes in premiums would make a small amount of revenues available in the following year for amortizing high-interest investments.

The premium actually paid is still stored by the year it is paid, for use in the output routines.

The premium *actually paid* is now also stored by the year that the principle is due. 'This "predicted penalty" is used in the predictor equation for the following iteration. With this modification any change in premium always affects the predictor equation in the same year, the year that the principle is due. This change only occurs when the premium is actually paid, and the amount of this change decreases as the solution converges.

The premiums also affect the "highest interest first" selection process. If the life of the bond is (T) and the time of redemption is (t), then the premium is given by the equation:

$$\text{premium} = rp(T-t)/T.$$

or if the bond has a callable at par provision in the remaining (t1) Years of its life, the premium is given by the equation:

$$\text{premium} = rp(T-t-t1)/(T-t1) \quad \text{if } t \leq (T-t1) \text{ otherwise premium} = 0$$

The total interest paid on the bond is given by the equation:

$$\text{interest} = rpt.$$

Combining the two we get:

$$\begin{aligned}\text{interest} + \text{premium} &= rpt + rp(T-t)/T \\ &= rpt(1-1/T) + rp.\end{aligned}$$

or, in the case of the bond callable at par

$$\begin{aligned}\text{interest} + \text{premium} &= rpt + rp(T-t-t1)/(T-t1) \\ &= rpt(1-1/(T-t1)) + rp \\ \text{if } t > T-t1 \quad \text{then} \quad &= rpt\end{aligned}$$

Thus, such a premium is equivalent to a fixed premium together with a reduced interest rate. This fixed premium must be paid (unless bond is callable at par) regardless of when the bond is redeemed. This "reduced" interest rate will be used when comparing obligations to determine which one should be retired first.

### **Surplus Revenues**

In the later years of the Study (and conceivably at any time during the Study), there may be revenues available but nothing on which to expend them on. Thus, a "surplus" term must be included in the revenue equation and will consequently manifest itself in the predictor equation. Since the surplus is not obligatory, it will be carried on the right-hand side of the predictor equation.

### **Minimizing Revenues**

The repayment program has provisions for determining a set of minimum revenues sufficient to meet a given set of annual expenses and cover a given set of long-term obligations.

If unequal maximum and minimum revenue change parameters are supplied to the program, or if the (unequal) default parameters are used, then the program will perform a *binary search* to determine the minimum sufficient revenues. The set of revenues is multiplied by the minimum revenue change and the resulting revenues are tested for sufficiency. If revenues are not sufficient, this is indeed a minimum revenue change, e.g., no lower change will provide sufficient revenues. If sufficient, then this revenue becomes a maximum; it is divided by two to obtain a new minimum candidate and this cycle is repeated, if necessary, until a minimum change is obtained.

If a maximum has not yet been determined, then the given revenues are multiplied by the maximum revenue change and the resulting revenues are tested for sufficiency. If sufficient, this is indeed a maximum revenue change, i.e., the maximum of the range we must consider. If insufficient, then this revenue change becomes a new minimum: it is multiplied by two to obtain a new maximum candidate and this cycle is repeated, if necessary, until a maximum change is obtained.

A revenue change halfway between the present maximum and minimum is now determined and the resulting revenues are tested for sufficiency. If sufficient, this midpoint becomes a new maximum; if insufficient, it becomes a new minimum. In either case, the difference between the maximum and the minimum is only half of what it was previously. If this difference is greater than some specified (or default) accuracy, then this cycle is repeated until the difference is less than the specified accuracy. When this difference is less than the specified accuracy, then the current maximum rate change provides the *minimum sufficient* revenues at this accuracy.

## **REPAYMENT PROGRAM LOGIC**

The diagrams on the following pages show the flow of logic in BPA's repayment program.

The first diagram shows the logic of the binary search used to locate minimum sufficient revenues. A necessary part of this search is the test for sufficiency. The logic of the test for sufficiency is shown on the remaining two diagrams.

The equations which are referred to are:

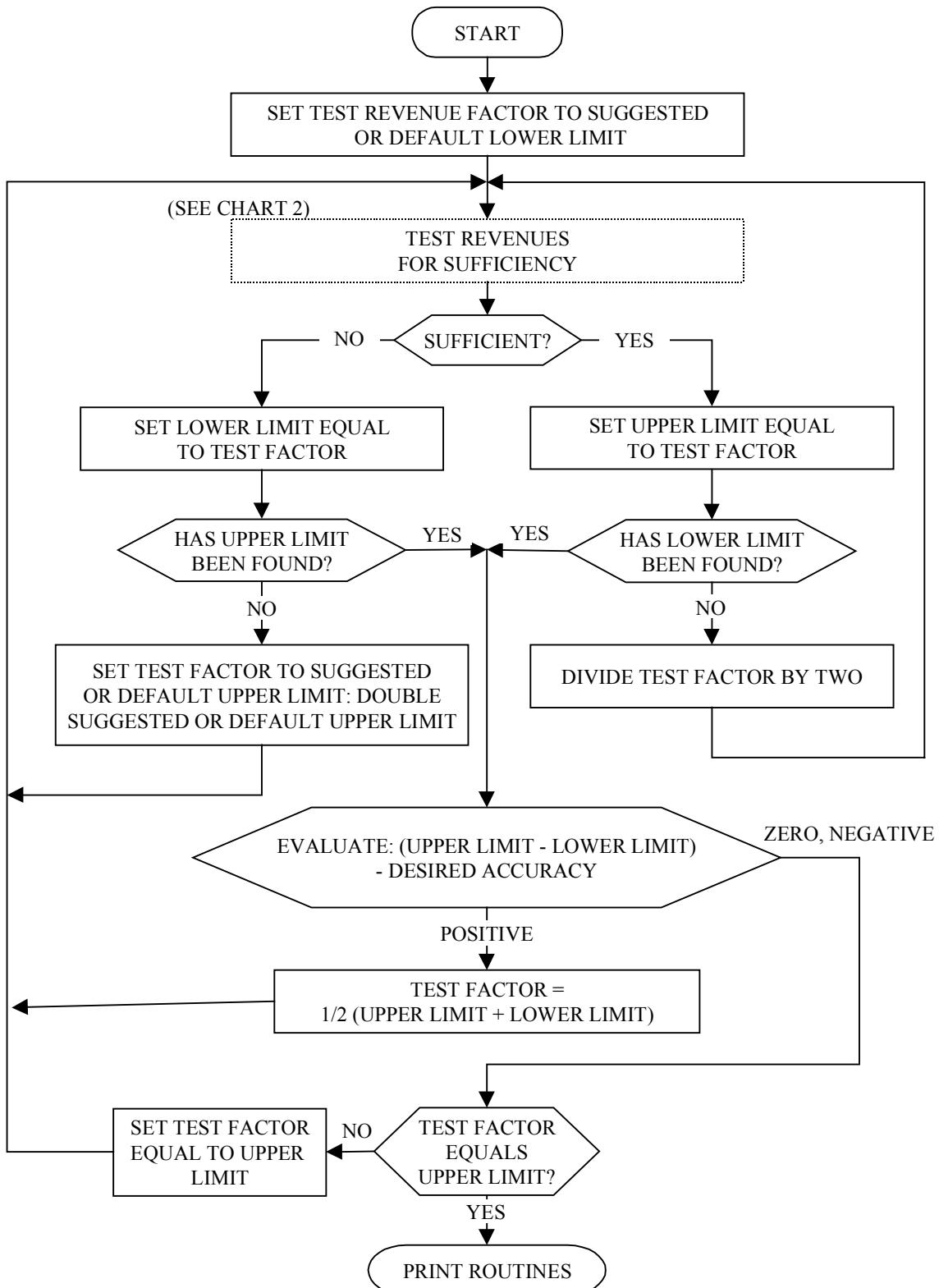
Revenue Equation: Net revenues of each year are expended on interest and payments on the principles.

Investment equation: The payments on each investment are less than or equal to the principle of that investment (and equal to the principle of that investment after the investment is due).

Predictor equation: For each future year the accumulated revenues less the accumulated interest less the accumulated investments due is equal to the accumulated payments on high interest rate investments which are not due.

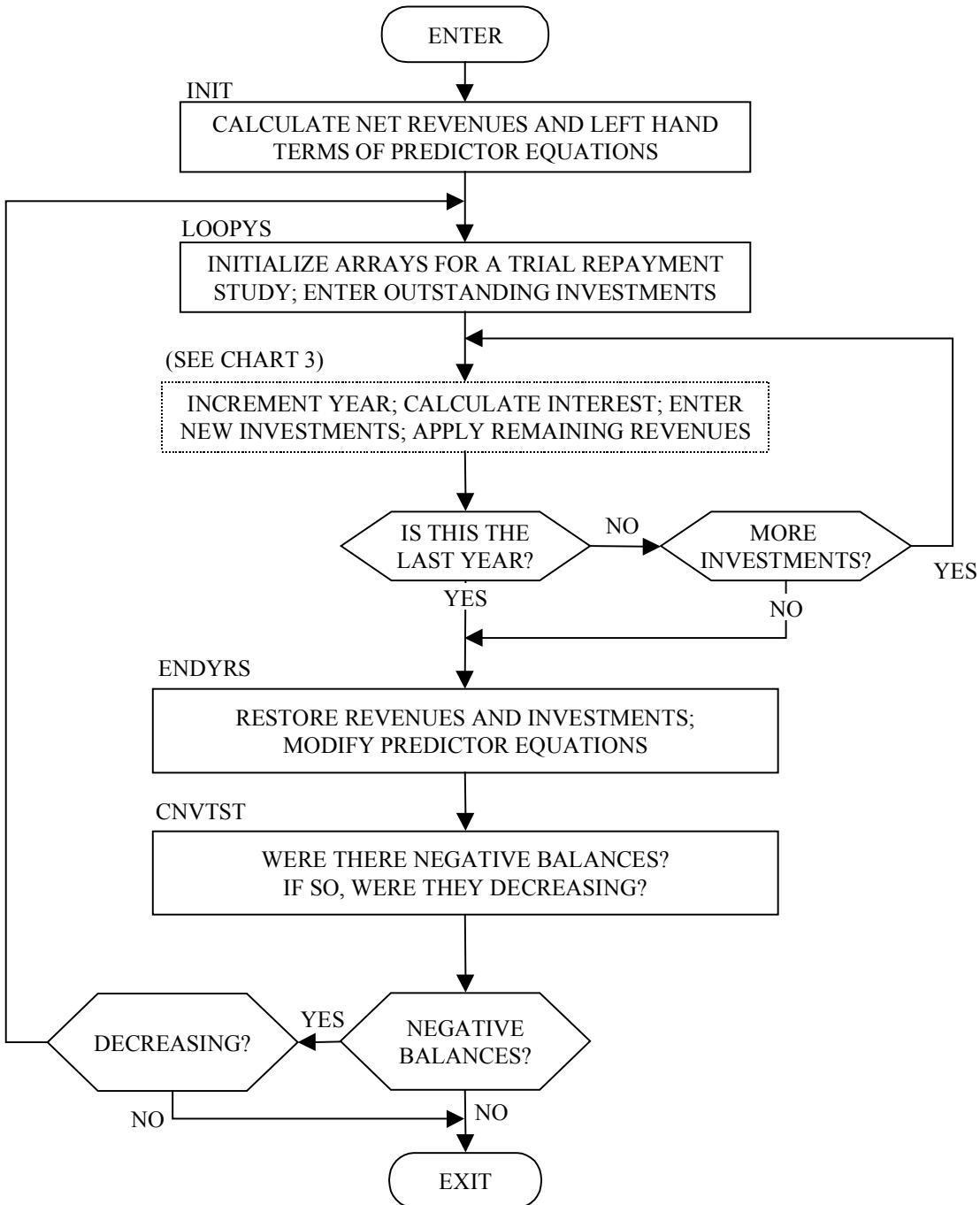
These equations are developed in more detail elsewhere in both the Study and the Documentation.

**REPAYMENT PROGRAM  
(BINARY SEARCH)**  
*CHART 1*



**REPAYMENT PROGRAM  
(TEST FOR SUFFICIENCY)**

CHART 2



**REPAYMENT PROGRAM  
(APPLICATION OF REVENUES)**  
CHART 3

