PacifiCorp Capacity Power Sale Contract Final Environmental Impact Statement (DOE/EIS-0171)

Responsible Agency: U.S. Department of Energy, Bonneville Power Administration (BPA)

Title of Proposed Action: PacifiCorp Capacity Power Sale Contract

States and Provinces Involved: Washington, Oregon, Idaho, Montana, Wyoming, Utah, Colorado, New Mexico, California, Nevada, Arizona, British Columbia.

Abstract: The Bonneville Power Administration (BPA) has surplus electrical capacity (peakload energy) that BPA projects will not be required to meet its existing obligations. Such obligations include those to meet the loads of firm power customers, pursuant to the Pacific Northwest Electric Power Planning and Conservation Act (Northwest Power Act), and previously committed capacity contracts.

BPA is authorized under the Northwest Power Act (§35(f)) to sell system capacity and/or energy that is surplus to its needs, with the obligation to offer any available surplus capacity/energy first to customers in the Pacific Northwest region.

BPA and PacifiCorp have negotiated a long-term contract for peaking capacity. The proposed long-term contract is for 1100 megawatts (MW) of contract demand limited to no more than 50 megawatthours (MWh) per week per megawatt of contract demand. Returns of peaking replacement energy are to be made within 168 hours. The proposed contract would expire August 31, 2011.

Alternatives considered were: Alternative 1, the Proposed Contract; Alternative 2, No Action; Alternative 3, Larger Capacity Sale; Alternative 4, Stricter Return Provisions; and Alternative 5, Variations in Hours of Peak Demand Available. Alternative 1, the Proposed Contract, is the preferred alternative.

The No Action Alternative is expected to result in substantial impacts on air quality and resource consumption (particularly natural gas) related to the expected construction by PacifiCorp of combustion turbine projects to meet its peaking capacity needs in the absence of an assured long-term supply of capacity from BPA. Alternative 3, in which BPA would sell 900 MW of additional capacity to PacifiCorp or to other utilities, is expected to have the least impact on air quality and resource consumption because it would be expected to result in the least amount of new resource construction and operation. The impacts of the other alternatives are generally related to the respective parties' abilities to optimize operation of their power resources and have lesser potential environmental impacts.

Because comments on the draft EIS were minor, and differences in the text of the draft and final EISs are minimal, the Final EIS is not being redistributed in accordance with §1503.4(c) of the Council on Environmental Quality Regulations for implementing the National Environmental Policy Act. Instead, the Draft EIS and this volume of Comments, Responses, and Errata constitute the Final EIS.

This Final EIS is being mailed to over 200 agencies, groups, and individuals.

To request additional copies of the Final EIS, please contact:

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Chapter 1: Purpose of and Need for Action

1.1 Introduction

The Bonneville Power Administration (BPA) has surplus electrical capacity (peakload energy) that BPA projects will not be required to meet its existing obligations. Such obligations include those to meet the loads of firm power customers, pursuant to the Pacific Northwest Electric Power Planning and Conservation Act (Northwest Power Act), and previously committed capacity contracts.

BPA is authorized under the Northwest Power Act (§35(f)) to sell system capacity and/or energy that is surplus to its needs, with the obligation to offer any available surplus capacity/energy first to customers in the Pacific Northwest region.

See Chapter 8 for a list of acronyms, abbreviations, and definitions of terms as they are used in this Environmental Impact Statement (EIS).

1.2 The Proposed Action

BPA and PacifiCorp (formerly doing business as Pacific Power & Light Company, a.k.a. PP&L, a Pacific Northwest private utility) have negotiated a long-term contract for peaking capacity. The proposed long-term contract is for 1100 megawatts (MW) of contract demand limited to no more than 10 hours per day and 50 hours per week of maximum contract demand. The proposed contract would expire August 31, 2011. (See Chapter 2, section 2.1, for more details.)

In most cases, BPA could serve the long-term PacifiCorp capacity contract using capacity available from BPA resources that is surplus to other needs. However, as preference loads grow, capacity that is available on the Federal Columbia River Power System (FCRPS) now may be required to serve preference loads later. One of the primary issues addressed in this EIS is the future resource implications of the proposed 1100 megawatt (MW) long-term capacity contract with PacifiCorp.

PacifiCorp had a contract with BPA providing for PacifiCorp's purchase of 1127.3 MW of peaking capacity ending August 31, 1991. BPA and PacifiCorp have entered into short-term surplus firm capacity sale agreements under which BPA provides capacity service to PacifiCorp. BPA conducted a process to evaluate the rates to be charged for capacity sales under the new contract in accordance with section 7(i) of the Northwest Power Act. The rate was approved by the Federal Energy Regulatory Commission (FERC) and is available for use under the proposed contract.

1.3 Need for Proposed Action

BPA must respond to the need for power as represented by PacifiCorp's request for a continued supply of firm capacity.

1.4 Purposes of the Proposed Action

The purposes of the proposed action are to:

1. Assist PacifiCorp in meeting its need for long-term firm peaking capacity.

2. Use surplus capacity available on the BPA system to raise revenue to enhance BPA's ability to repay its debt, and to help hold down electric power rates.

3. Take advantage of the complementary characteristics of the largely hydro-based BPA system and PacifiCorp's

largely thermal-based system.

4. Protect BPA's ability to serve its existing contractual obligations and remain able to meet the needs of its customers in accord with the Northwest Power Act as existing contracts expire.

5. Meet BPA's obligations under the Northwest Power Act to protect, mitigate, and enhance fish and wildlife.

1.5 Relationship to Other Actions

1.5.1 System Operation Review and EIS

BPA, the U.S. Army Corps of Engineers, and the U.S. Bureau of Reclamation are jointly conducting the Columbia River System Operation Review (SOR). A Final Environmental Impact Statement (SOR EIS) is planned for 1994. The SOR is a comprehensive evaluation of the options for managing Federal projects on the Columbia River for many uses, including power generation, flood control, irrigation, navigation, recreation, and fish and wildlife. The SOR EIS will cover broad issues related to balanced use of Federal multipurpose hydro facilities in the Columbia River Basin. The SOR process could lead to decisions affecting regional hydropower capability and operating flexibility. A broad range of interests is involved in the SOR and will continue to be involved through preparation of the associated EIS.

The SOR EIS will allow the three Federal agencies to make decisions on:

1. adopting a System Operating Strategy (SOS);

2. renegotiating and renewing the Pacific Northwest Coordination Agreement (PNCA);

3. renewing or developing five new Canadian Entitlement Allocation Agreements; and

4. developing a means to periodically review and update the SOS.

The proposals studied in the PacifiCorp Capacity Sale EIS do not supplant the SOR decision process. BPA serves its contractual obligations with its mix of resources consistent with the operating constraints applicable to each resource.

This EIS will not analyze changes in hydropower operations, because the PacifiCorp contract is not a decision on particular hydropower operations. Instead, the contract is a system operational obligation to be met with all of the resources at BPA's disposal, including thermal resources and future acquisitions.

The PacifiCorp Capacity Sale EIS analyzes alternatives that could rely exclusively on thermal resources and/or acquisition of additional resources.

1.5.2 Resource Programs Final EIS

BPA's Resource Program establishes a long-term strategy and budget plan for development of conservation and other resources. BPA prepared the Resource Programs Final EIS (DOE/EIS-0162, February 1993), which is intended to provide information for use in future Resource Program processes. The Resource Programs EIS is a programmatic document that looks at the effects on resource operation and development of generalized resource acquisition strategies. Because the Resource Programs EIS identifies and analyzes implications of BPA and non-BPA Pacific Northwest resources, certain portions are incorporated by references within the text of this EIS. The analysis in this EIS is consistent with the assumptions used in the 1992 BPA Resource Program. Actual BPA resource acquisitions are subject to site-specific environmental processes.

1.5.3 1992 Columbia River Salmon Flow Measures Options Analysis/EIS and 1993 Supplemental EIS

BPA cooperated with the U.S. Army Corps of Engineers in conducting these studies, which looked at alternate annual

hydro operating plans for periods prior to the completion of the SOR process. Biological assess-ments have been prepared addressing effects on potential endangered or threatened species pursuant to the Endangered Species Act.

1.5.4 Non-Federal Participation EIS

BPA has prepared an EIS on proposals to provide non-Federal participation in BPA's share of the Pacific Northwest-Pacific Southwest Intertie (Intertie) and for BPA marketing and joint ventures with California. BPA marketing and joint ventures may involve use of available Federal Intertie capacity for sales or exchanges with California parties.

1.5.5 Initial Northwest Power Act Power Sales Contracts Final EIS

The Power Sales Contracts Final EIS (DOE/EIS-0131, January 1992) addressed potential amendments to power sales contracts as offered in 1981 under the Northwest Power Act.

1.5.6 BPA Ratemaking

The rate for the proposed PacifiCorp capacity contract has been approved by FERC. This rate, PPL-90, was developed in a proceeding pursuant to section 7(i) of the Northwest Power Act. No other rate or alternative rate is at issue for purposes of this EIS, and decisions involving the exercise of BPA ratemaking authority will not be analyzed in this EIS.

1.5.7 Business Plan (formerly Commercial Services and Rates) EIS

In 1992, BPA began preparing to negotiate new power sales contracts to replace its current requirements contracts with public and private utilities, direct service industries, and Federal agencies. Scoping discussions for the EIS led to expanding the subject matter of the process to include power system services, including wheeling, for service to Pacific Northwest firm loads, and rates for wholesale power transmission. More recently, the EIS has been expanded to address the decisions BPA will make in adopting its 1994 Business Plan. The current power sales contract with PacifiCorp is a mechanism through which PacifiCorp could, assuming certain notice provisions are met, secure a long-term source of capacity. However, the current power sales contract provisions for delivery of capacity do not provide the flexibility PacifiCorp desires. The new power sales contracts and services BPA will offer under the Business Plan may be sufficiently different from the existing contract terms to make it attractive for PacifiCorp to someday place capacity load on BPA through the power sales contract.

1.5.8 Increases in Intertie Capacity to the Southwest

The amount and availability of interregional intertie transmission capacities, as well as policies and actions that define their use, can influence future decisions regarding power transactions and resource acquisitions by BPA, PacfiCorp, and other utilities in the region. Increases in intertie capacity and transmission availability to California and the Inland Southwest can lead to specific environmental effects due to potential increases in thermal resource development or changes in thermal resource operations. These changes in transmission availability and capacity could affect the manner in which PacifiCorp chooses to use the proposed capacity contract. The full implication of how these potential changes may impact the PacifiCorp capacity contract is remote and speculative. Issues relating to transmission availability and capacity are being addressed in the Non-Federal Participation EIS and the Southwest Intertie Project EIS. The former EIS has been prepared by BPA; the latter is being prepared by the Bureau of Land Management.

Chapter 2: Alternatives Including the Proposed Action

This EIS analyzes five alternatives. Alternative 1, the Proposed Action Alternative, describes the consequences of proceeding with the proposed PacifiCorp Surplus Firm Capacity Sale Contract (see Appendix A). Alternative 2, the No Action Alternative, describes the consequences of not making the proposed sale to PacifiCorp. The other alternatives analyze the effects of implementing variations in the terms of the proposed sale. Alternative 3, Larger Capacity Sale, describes the consequences of selling an additional 900 MW to PacifiCorp or another utility. Alternative 4, Stricter Return Provisions, describes the consequences of restricting the hours PacifiCorp has for making returns of peak energy (peak replacement). Alternative 5, Variations in Hours of Peak Demand Available, describes the consequences of increasing the hours (and thus the total peak energy) for delivery of peak demand to PacifiCorp.

2.1 Preferred Alternative (Alternative 1, Proposed Action)

The proposed long-term contract, Alternative 1, would expire August 31, 2011. The contract demand would be 1100 MW of capacity. Capacity and associated peaking energy would be provided up to a maximum of 10 MWh (megawatthours) per day per MW of contract demand, limited to no more than 50 MWh per week per MW of contract demand. Returns of replacement peaking energy normally are to be made by PacifiCorp within 168 hours.

A copy of the proposed long-term contract is provided in Appendix A. This copy is complete except that an additional point of delivery, Summer Lake Substation in south-central Oregon, would be added to the final contract if it is implemented. Adding this point of delivery to the contract will provide an additional point for BPA to make capacity deliveries to PacifiCorp, and for PacifiCorp to return peaking replacement energy, and has no substantive effect on how the contract would be used by PacifiCorp, or how BPA would meet its obligations under the contract.

The proposed contract includes operational provisions that would permit BPA to limit hourly rates of return of replacement peaking energy in the months of March through October. PacifiCorp is to preschedule deliveries each workday for each hour of the following day or days until the next regular workday. PacifiCorp would have a right to change these schedules with 30 minutes' notice but the total changes from prescheduled deliveries during heavy load hours would be limited to 6 hours per day. This is consistent with normal scheduling procedures now in use by BPA and scheduling utilities.

The proposed price for the capacity is to be escalated to reflect changes in BPA's average system cost (base) as determined in each successive BPA general rate case after September 1, 1991. With 5-year written notice to PacifiCorp, BPA may reduce contract demand (to zero if need be) to meet statutory obligations to preference customers; to meet prior contractual obligations including exchange obligations; or to meet capacity/exchange obligations incurred subsequent to the contract if at the time of incurring such subsequent obligation BPA had projected at least 300 MW firm capacity in excess of the aggregate of the new obligations.

Once BPA has reduced contract demand, it must offer to restore contract demand under certain conditions. PacifiCorp also has certain limited rights to reduce contract demand upon 5 years' written notice, or under special conditions, upon 1 year's notice. (See section 7 of the proposed contract, located in Appendix A of this document, for details on the two parties' respective rights to reduce or restore contract demand.)

This alternative is the Preferred Alternative because it secures a long-term source of revenue through a sale of capacity surplus to BPA's current and foreseen needs at a price well above what BPA could achieve through spot market sales. This will help stabilize BPA's wholesale power rates and BPA's revenues, thus helping to assure timely repayment of debt. Currently, BPA is not aware of an equivalent market for long-term firm capacity.

The Preferred Alternative would enable BPA and PacifiCorp to benefit from the complementary characteristics of their respective systems. PacifiCorp could maintain its thermal-based system and rely on BPA for much of its capacity needs. PacifiCorp's principally base-loaded thermal system is less accommodating to large load swings than BPA's

principally hydro-based system, which can accommodate rapid load swings.

In addition, this alternative is preferred because it has the potential to make full use of existing resources on both systems, thereby reducing PacifiCorp's need to develop new resources with their attendant risks, adverse rate effects on PacifiCorp's customers, and adverse environmental impacts. Other alternatives studied are less desirable because they do not fulfill the needs of the two parties to the sale as completely.

2.2 Alternative 2: No Action

The "No Action" Alternative is not entering into a long-term capacity contract with PacifiCorp. In the absence of such a contract, BPA would use the flexibility on its system to serve the purposes listed in section 1.4. BPA expects that it would use the flexibility on the system in the absence of a long-term PacifiCorp capacity contract to support additional short-term energy sales, to perform more seasonal storage transactions, and to make short-term or spot capacity sales or exchanges. There would be no potential need to acquire resources to support this alternative. Hydro operations will be consistent, as they would under any of the alternatives, with the outcome of the SOR process and interim operations, as documented by the 1992 Flow EIS and later supplements. The need stated in section 1.3, that is, to respond to the need for power as represented by PacifiCorp's request for a continued supply of firm capacity, would be unfulfilled. Some of the purposes, such as securing revenues through the sale of surplus capacity, may be met to a lesser degree than under other alternatives. In the near term, PacifiCorp may purchase some capacity (up to 800 aMW plus 15 percent reserves) on a short-term or nonfirm basis from BPA in the absence of a long-term contract, but would eventually secure its own resources and/or make long-term capacity arrangements with other utilities to meet its capacity needs.

2.3 Alternative 3: Larger Capacity Sale

Under this alternative, BPA would contract for an additional 900 MW of contract demand with PacifiCorp and/or other utilities under terms similar to the proposed contract. Based on current forecasts, BPA could serve the additional 900 MW by using surplus capacity that is available from BPA resources.

2.4 Alternative 4: Stricter Return Provisions

This alternative provides less flexibility to PacifiCorp in exercising its rights under the contract. This alternative is the same as the proposed action except BPA would impose stricter return provisions. In lieu of the 168-hour return in the proposed contract (§5(b)(1)), BPA would require either a 24-hour return (i.e., PacifiCorp would have to return energy associated with the delivery of peaking capacity within 24 hours of delivery instead of within 168 hours), or an end-of-week return (i.e., all peaking energy taken by PacifiCorp during a calendar week must be returned by midnight Sunday). A 24-hour return was an option under the old, now expired, long-term contract.

2.5 Alternative 5: Variations in Hours of Peak Demand Available

This alternative provides more flexibility to PacifiCorp in exercising its rights under the contract by relaxing some terms of the proposed contract.

First, BPA would make a greater amount of peaking energy available to PacifiCorp each day for the week while keeping the contract demand the same as in the proposed contract (i.e., 1100 MW). The proposed contract limits the amount of peaking energy to 50 hours of peak demand of 1100 MW for a total of 55,000 MWh per week. Under this alternative, BPA would allow PacifiCorp the additional flexibility to increase the number of hours of peak demand and thus increase the amount of peaking energy available for the week. This alternative assumes that BPA increases the amount of peaking energy available to PacifiCorp to an amount equal to the proposed contract demand of 1100 MW times 72 peak hours, a common hourly amount offered in some short-term BPA contracts. Total peaking energy would thus be 79,200 MWh.

Second, the special restrictions specified in §5(b)(3) and §5(b)(4) of the proposed contract on return of peak energy

(peak replacement) during the fish flow augmentation months of March through October are deleted.

    

Chapter 3: The Affected Environment

3.1 Study Area

The study area includes BPA's service area, which covers the States of Idaho, Oregon, and Washington; the State of Montana west of the Continental Divide; and small portions of the States of Wyoming, Utah, Nevada, and Northern California (collectively referred to as the Pacific Northwest).

In addition, areas in eastern Montana, north-central Nevada, and southwestern Wyoming surrounding coal plants that serve the Pacific Northwest; the State of California; the State of Colorado; and the States of Nevada, Arizona, Utah, and New Mexico (collectively referred to as the Inland Southwest) are studied for socioeconomic and power system concerns. (In this document, the Inland Southwest and the State of California are collectively referred to as the Pacific Southwest.)

The area potentially affected by the alternatives under consideration is very broad. In addition, many impacts discussed in Chapter 4 cannot be analyzed in detail because they relate to construction of new generating resources whose sites can only be defined in a broad sense, such as a portion of a state (e.g., Northern Utah). Thus, it is not meaningful to include information in this chapter about matters such as cultural resources or recreation that can only be evaluated on a site-specific basis. Therefore, the descriptions in the following sections focus on those aspects of the affected environment necessary to understand and compare the alternatives.

Appendices B and C contain supplemental information on the topics covered in this chapter.

3.2 Physical Description

Overview

The watersheds of the study area drain many of the great landforms of the western United States and feed many of the great rivers of the continent. These rivers are of crucial importance to BPA. The hydroelectric projects in the Columbia-Snake River Basin provide the vast majority of Federal electricity that the agency markets. Figure 3-1 shows the major rivers and basins in the study area.

Figure 3-2 characterizes the general ecosystem types found in the study area and indicates where major thermal energy facilities are located.

Threatened and endangered species as defined by the Endangered Species Act are an important consideration in choosing locations for energy facilities and may be affected by changes in their operation. Appendix B contains lists of threatened and endangered species found in each state of the study area.

Figure 3-1: Major Rivers and Drainage Basins of the Study Area

Drainage Basins:

1. Columbia-Snake 4. Colorado

2. Sacramento-San Joaquin 5. Rio Grande

3. Great Basin 6. Mississippi-Missouri-Ohio (partial view)

(Source: Adapted from the *Contemporary Atlas of the United States, 1990.*)

Figure 3-2: Locations of Ecosystem Regions and Major Thermal Energy Facilities

Air Quality

Pollutants of concern in this analysis are those produced by extracting, processing, transporting, and burning coal, oil, gas, or other fuels (e.g., waste wood) to produce electric power. Principal pollutants produced are the federally designated "criteria pollutants": sulfur dioxide (SO2), nitrogen oxides (NOx), particulates, hydrocarbons, ozone, carbon monoxide (CO), and lead. Of these, particulates, SO2, and NOx are common emissions from electrical generation relying on combustion. Carbon dioxide (CO2), a major by-product of burning fossil fuels and other carbonaceous materials, may contribute to global climate change. In addition to these common pollutants, combustion generating plants may also emit heavy metals, radionuclides, and hazardous compounds. Generating technologies and their associated emissions are discussed in the Resource Programs EIS (DOE/EIS-0162, February 1993).

Air quality is a concern in certain defined air basins and around certain existing generating plants in the study area. In these areas, more stringent controls are required for existing facilities, and any new major project must satisfy additional restrictions.

Nonattainment areas have air pollution concentrations that do not comply with a portion of the National Ambient Air Quality Standards. Federal air quality standards and state standards for Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming are shown in Table 3-1. Federal nonattainment areas in the study area are listed in Table 3-2.

Table 3-1: Ambient Air Quality Standards(1) in the Study Area

[micrograms per cubic meter (mg/m3) unless otherwise specified; secondary standards in parentheses]

	National Standard1	Arizona	California	Colorado	Idaho	Montana
Suspended Particulates (PM-10) 24-hr average annual average2 other	150(150) 50(50)	150(150) 50(50)	50 303	150(150) 50(50)	150(150)5 50(50)	150 50
Sulfur Dioxide 1-hr average 3-hr average 24-hr average Annual average2	(1300)5 3655 80	(1300)5 3655 80	655 105	7005	(1300)5 3655 80	0.5 ppm6,7 0.10 ppm 0.02 ppm
Nitrogen Dioxide 1 hr average Annual average2 other	100(100)	100(100)	470	100	100(100)	0.3 ppm 0.05 ppm
Ozone 1 hr average	235(235)	235(235)5	180	160(235)5	235(235)5	0.1 ppm
Carbon Monoxide10 1-hr average 8-hr average other	405 105	405 105	20 1011	405 105	40(40)5 10(10)5	
Lead 30-day average 90-day average Quarterly average2 Other	1.5(1.5)	1.5(1.5)	1.5		1.5(1.5)	1.5

Hydrogen Sulfide 1-hr average Other			42			0.05 ppm
Total Suspended Particulates 24-hr max annual average					260(150) 76(60)	

Table 3-1 (continued): Ambient Air Quality Standards in the Study Area

	Nevada	N. Mexico	Oregon	Utah	Washington	Wyoming
Suspended Particulates (PM-10) 24-hr average annual average2 other	150 50	150 603 110,904	150 502, 603	150 50	150 50	150 50
Sulfur Dioxide 1-hr average 3-hr average 24-hr average Annual average2	1300 365 80	.10 ppm 0.02 ppm	0.5 ppm 0.1 ppm 0.02 ppm	(1300) 365 80	(see below)8 0.1 ppm 0.02 ppm	13005 260 60
Nitrogen Dioxide 1 hr average Annual average2 other	100	0.05 ppm 0.10 ppm9	0.053 ppm	100	100	100
Ozone 1 hr average	235	0.06 ppm	0.12 ppm	235	235	160
Carbon Monoxide10 1-hr average 8-hr average Other	40 1012	13.1 ppm 8.7 ppm	35 9	40 10	40 10	405 105
Lead 30-day average 90-day average Quarterly average2 Other	1.5		1.5	1.5		
Hydrogen Sulfide 1-hr average	112	0.01 ppm13				70,4014

Other						
Total Suspended Particulates 24-hr max annual average		- 150 60	150 60		150 60	150

NOTES

1. 40 CFR 50

2. Arithmetic average

3. Geometric average

4. These two standards for New Mexico are 7 and 30-day averages, respectively

5. Maximum value not to be exceeded more than once per year

6. ppm = parts per million

7. Average concentration not to be exceeded more than 18 times in 12 consecutive months

8. Washington State has two 1-hour standards for sulfur dioxide: 0.4 ppm not to be exceeded more than once per year and 0.25 ppm not to be exceeded more than twice during a 7-day period

9. 24-hour average

10. Carbon monoxide (CO) standards expressed in milligrams per cubic meter (mg/m3) unless otherwise specified

11. Equivalent standard for the Lake Tahoe Air Basin is 6 ppm

12. Applies to areas less than 5,000 feet in elevation above mean sea level (MSL); at higher elevations the standard is 6 ppm

13. Excluding Pecos-Permias Basin Interstate Air Quality Control Region

14. 70 and 40 mg/m3 are the half-hour averages not to be exceeded more than twice per year and twice per 5-days, respectively

Table 3-2: Federal Nonattainment Areas in the Study Area

	SO2	**NO1**	**NO2**	**CO**	**PM10**	**O3**	**TSP**
Idaho(2)							
Boise & portion of Ada County					Ö	Ö	
City of Pinehurst						Ö	
City of Pocatello					Ö	Ö	
Bonner County (Sandpoint)						Ö	

Kootenai County (Coeur d' Alene)								Ö					
Oregon1													
Medford-Ashland								Ö					
Grants Pass								Ö					
Eugene-Springfield								Ö					
Klamath Falls								Ö					
LaGrande								Ö					
Oakridge								Ö					
Portland/Vancouver						Ö			Ö				
Salem						Ö			Ö				
Jackson County						Ö							
Josephine County						Ö							
Lane County						Ö							
Washington1													
A portion of Seattle									Ö				
A portion of Spokane County									Ö				
A portion of Tacoma									Ö				
A portion of Yakima County									Ö				
City of Kent									Ö				
Cities of Olympia, Tumwater, and Lacey									Ö				
Wallula									Ö				
Benton County (Kennewick)									Ö				
Clark County								Ö		Ö			
Seattle-Tacoma CMSA								Ö					
Yakima County								Ö					

Table 3-2, continued: Federal Nonattainment Areas in the Study Area

	SO2		**NO1**		**NO2**		**CO**		**PM10**			**O3**			**TSP**		
Arizona1																	
Ajo								Ö									Ö
Douglas								Ö									Ö
Hayden								Ö									Ö
Joseph City																	Ö
Miami								Ö									Ö
Paul Spur																	Ö

Phoenix							Ö
Tucson				Ö			Ö
San Manuel	Ö						
Morenci	Ö						Ö
Remainder of State							Ö
Maricopa				Ö		Ö	

California1								
North Central Coast Air Basin						Ö		
South Central Coast Air Basin						Ö	Ö	
San Diego Air Basin				Ö	Ö	Ö	Ö	
South Coast Air Basin			Ö	Ö	Ö	Ö	Ö	
San Joaquin Valley				Ö	Ö	Ö	Ö	
Sacramento Valley Air Basin				Ö	Ö	Ö		
Southeast Desert Air Basin						Ö	Ö	
San Francisco Bay Area Air Basin				Ö		Ö	Ö	
Mountain Counties Air Basin						Ö	Ö	
Lake Tahoe Air Basin				Ö				
Sacramento Valley Air Basin				Ö	Ö	Ö		
Southeast Desert Air Basin						Ö	Ö	
San Francisco Bay Area Air Basin				Ö		Ö	Ö	
Mountain Counties Air Basin						Ö	Ö	
Lake Tahoe Air Basin				Ö				

Table 3-2, continued: Federal Nonattainment Areas in the Study Area

	SO2	**NO1**	**NO2**	**CO**	**PM10**	**O3**	**TSP**
Colorado1							
Fort Collins & Greeley							Ö
Denver Urbanized Area							Ö
Boulder Urbanized Area							Ö
Colorado Springs 3-C							Ö
Grand Junction Urbanized							Ö
Nevada1							
Las Vegas Valley				Ö			Ö
Carson Desert							Ö
Winnemucca Segment							Ö

Lower Reese Valley							Ö
Gabbs Valley							Ö
Fernley Area							Ö
Truckee Meadows				Ö			Ö
Mason Valley							Ö
Steptoe Valley Central	Ö						
Clovers Area							Ö
Lake Tahoe Valley				Ö			
Utah1							
Ogden (new)				Ö			
Provo				Ö			
Salt Lake City (temp suspd)				Ö	Ö	Ö	
Utah County					Ö		
Salt Lake County	Ö						
Tooele County (elevated)	Ö						
Montana1							
Billings		Ö		Ö			
Great Falls (temp suspd)				Ö			
Missoula				Ö	Ö		
Butte					Ö		
Columbia Falls					Ö		
Kalispell					Ö		
Libby					Ö		
Thompson Falls (new)					Ö		
Lame Deer (TIP)					Ö		
Polson (TIP)					Ö		
Ronan (TIP)					Ö		
East Helena (new) [lead]							
Lewis & Clark County	Ö						
Yellowstone County	Ö						

Table 3-2, continued: Federal Nonattainment Areas in the Study Area

	SO2	**NO1**	**NO2**	**CO**	**PM10**	**O3**	**TSP**
Wyoming1							
Sheridan						Ö	

New Mexico(3)							
Bernalillo County				Ö			
Aspermont	Ö						
Anthony					Ö		

3.3 Social and Economic Considerations

3.3.1 Geography and Land Use

Pacific Northwest

The geography and land uses of the affected environment in the Pacific Northwest center on the Columbia-Snake River system. The Columbia River Basin contains more than 668,220 square kilometers

(258,000 square miles) of drainage, including most of Washington, Oregon, and Idaho; Montana west of the Rocky Mountains; small areas of Wyoming, Utah, and Nevada; and southeastern British Columbia.

The Pacific Northwest includes all or portions of three physiographic provinces: Northern Rocky Mountain, Columbia Plateau, and Pacific Mountain system. Major features include the Columbia and Snake Rivers, the Puget Sound and Willamette Valley plains, and the Coast Range, Cascade, and Rocky Mountains. These features define the climate, vegetation, transportation, and development patterns of the region.

Half the region is covered by forest (primarily Douglas fir or varieties of pine), most densely west of the Cascade Range. Rangeland occupies substantial areas in the Snake River and Rocky Mountain regions. Agricultural lands are located primarily on the Columbia River Plateau, along the Snake River, and in the Willamette Valley. About two-thirds of the land in the region is publicly owned, enabling the development of multiple use land programs and extensive recreational opportunities. Land managers include the Federal Government (including the U.S. Forest Service, Bureau of Land Management, Department of Energy, and Department of Defense), state and local governments, and Indian tribes. The rest of the land is privately owned.

The Cascade Range, which runs north-south, divides Oregon and Washington into two unequal and widely different climatic regions. Coastal climate is mild and wet, with only occasional extremes of temperature. East of the Cascades, most of the precipitation occurs in the winter in the form of snow, and summer months are hot and dry.

Idaho experiences a wide variation in climate. Pacific Ocean air brings temperate climate to the northern third of the state, while high mountains on the eastern border tend to block cold air from Montana and Wyoming.

Elevations of the Pacific Northwest range from sea level to 4392 meters (14,410 feet) at Mt. Rainier in Washington.

Beginning in southeastern British Columbia, the Columbia River flows south and west for 1954 kilometers (1214 miles) to the Pacific Ocean. From the point it passes into the State of Washington to its mouth, it drops steadily for 1204 kilometers (748 miles) . The Snake River, which is 1671 kilometers (1038 miles) long, begins in northwestern Wyoming. It flows west and north, forming part of the borders between Oregon and Idaho and between Idaho and Washington. Part of that border is the nation's deepest canyon (Hell's Canyon).

In southern Washington, the Snake River joins the Columbia and they flow west and north, forming the border between Oregon and Washington. The rivers flow through extensive wilderness, scenic, and recreation areas. The rivers pass through irrigated agricultural area in the plateaus east of the Cascade Mountains and through the Cascade and Coast Mountain Ranges on their way to the Pacific Ocean.

Pacific Southwest

California is mostly part of the Pacific Mountain System physiographic region, although portions of southeastern California are part of the Basin and Range province.

The Southern Cascade Mountains and the Sierra Nevada form California's backbone, a barrier the length of the state that is traversed in only a few places. Elevations reach over 4267 meters (14,000 feet) above sea level at Mt. Whitney and Mt. Shasta. The majority of the mountain ranges trend north-south and exert major influences on the climate of the region, with extremes in several areas.

To the west of this barrier lie the Great Valley and the California Coast Ranges. The valley is a high-value agricultural area, heavily irrigated. The Coast Ranges, mostly lower than 1524 meters (5,000 feet), support commercial forestry, grazing, and specialty crops such as wine grapes.

To the east of the Cascades and Sierra barrier are the parts of California in the Basin and Range province. It is a semi-desert to desert region of plateaus, basins, plains, and isolated mountain ranges.

The Inland Southwest includes some of the driest portions of the United States. Physiographically, the region is in the Basin and Range, the Colorado Plateau, and portions of the Southern Rocky Mountain provinces. Topographically, the region encompasses the lowest and some of the highest elevations in the continental United States. The Colorado River Basin is the major drainage for the region, rising on the Continental Divide and ending at the Pacific Ocean. It contains major multipurpose dams, such as Hoover Dam, which provide electric power, water supplies, and recreation areas. The land is fairly arid, except for the Rocky Mountains, which are moderately wet. The area tends to be water-limited, with most precipitation occurring in the mountains. Land use includes mining and mineral processing, cattle ranching, and farming. Since much of the land is arid, agriculture is dependent upon irrigation, although dry farming is practiced in portions of New Mexico.

Other Potentially Affected Areas

State of Colorado - Colorado's geography is varied: dry, high plains in the eastern portion of the state, a hilly to mountainous central plateau, and the high ranges of the Rocky Mountains alternating with broad valleys and deep, narrow canyons to the west.

Colorado contains approximately 269,359 square kilometers

(104,000 square miles), with 8.7 million hectares (21.4 million acres)

of forested land (primarily Douglas fir, ponderosa pine, and oak).

The state's climate is characterized by low humidity, sunshine, and wide daily seasonal temperature ranges, with alpine conditions in the high mountains.

State of Wyoming - The area of Wyoming is 253,324 square kilometers (97,809 square miles), including 4 million hectares (9.9 million acres) of forests (primarily ponderosa and lodgepole pine, Douglas fir, and spruce). The state lies in the high western plateaus of the Great Plains, with the Continental Divide crossing the state from northwest to southeast. Wyoming's climate is semi-desert. Geologic resources include rich deposits of uranium, oil, natural gas, and sodium carbonate.

State of Nevada - Nevada encompasses 286,349 square kilometers (110,560 square miles), with 3.6 million hectares (8.9 million acres) forested in pines, pinyons, and juniper. Rugged mountain ranges trend north-south. The state's climate is arid and semi-arid, with the Mojave Desert occupying the state's southern area. The Colorado River crosses the southern tip of the state. Hoover Dam, on the Colorado River, impounds Lake Mead, one of the world's largest artificial lakes. Nevada boasts rich deposits of gold, with smaller deposits of silver, lead, zinc, and mercury.

State of New Mexico - New Mexico, with an area totaling 314,924 square kilometers (121,593 square miles), spans three geographic regions: the eastern third lying within the Great Plains region, the central portion within the Rocky Mountain region, and the western third within the High Plateau. New Mexico's forested areas consist primarily of

ponderosa pine and Douglas fir. The state is rich in uranium and potassium salts.

3.3.2 Industry/Economic Base

Pacific Northwest

Over the past 10 years, the economy of the Pacific Northwest has evolved from being resource-based to being more diverse, with growing trade and service sectors. In 1980, resource-based industries accounted for 30.9 percent of manufacturing employment; by 1990, their share had fallen to 27.2 percent. High technology industries (aerospace, electronics, and scientific instruments) have grown in share over the last decade from 33.7 to 38.6 percent of total manufacturing. Overall, the manufacturing share of the regional economy was 19.4 percent in 1980 and fell to 17.3 percent by 1990.

The lumber and wood products industry still plays an important role in the region's economy, with 3.1 percent of the total regional employment, but this sector has declined from a decade ago, when it accounted for 4.4 percent of total employment. Food processing has fallen from 2.5 percent of total employment in 1980 to 2.1 percent in 1990. This loss of employment share has been due to an increase in the relative size of the employment base and productivity gains brought on by plant upgrades and other efficiencies. Transportation equipment, primarily Boeing, has remained at nearly 4 percent of total employment over the last decade, and the electronics industry has remained at about 3 percent of total employment. Energy-intensive aluminum production is economically important to the region, but the level of employment in this sector is relatively small (below 0.7 percent of total employment in 1990).

While the manufacturing share fell over the decade, the nonmanufacturing share of total employment rose from 80.6 to 82.7 percent. A rise in wholesale and retail trade and services accounts for most of the gain. Employment in trade grew from 24.1 percent of total employment in 1980 to 24.7 percent in 1990. The services sector grew from 18.8 percent of total employment in 1980 to 23.4 percent in 1990. The region's growing trade with California and the Far East also broadened the economic base.

Twenty-five percent of U.S. exports to Asia and 30 percent of all U.S. exported goods are handled through Pacific Northwest ports. In fact, the Ports of Seattle and Tacoma are the fourth and sixth largest ports in the world, respectively.

The advantage of low-cost energy relative to other areas has strengthened the region's economic base. Due to the availability of natural gas from Canada and the region's hydro base for electricity, the Pacific Northwest has a long-term energy advantage. On average recently, the region's electricity prices ran 40 percent lower than the national average and natural gas prices were 16 percent less.

The region still can be hard-hit by high interest rates and their dampening effect on housing, which is the biggest source of demand for the region's lumber and wood products. However, more diversity and efficiency in industries in the region means more resistance to severe fluctuations now than in the past. Continued high levels of international trade should help offset the negative impact of periodic national business cycles, and the nonmanufacturing service sector of the region's economy is expected to continue to grow faster than total employment.

California, with over 29 million people (more than 10 percent of the nation's total population) represents an important market for the Pacific Northwest. The tourism industry, fueled by the scenic coast, Columbia River Gorge, and Hells Canyon, provides economic stimulus in less populated regions and helps stimulate activity in the service and trade sectors. Agriculture also is a substantial industry in the region, employing about 276,000 in 1990, down from about 285,000 in 1980. The decline in agriculture employment is part of the shift toward a less resource-dependent economy, and also is due to growing productivity in the farm sector.

Pacific Southwest

California has a rich endowment of natural resources. The state is a major source of the nation's fruits and vegetables. Its agricultural sector ranks first in the nation in cash value and produces virtually every crop grown in temperate

zones. Lumber production is second only to Oregon, and its mining production ranks among the top three states. Employment in manufacturing industries is the leading source of personal income, followed by government, wholesale and retail trade, and service occupations. The entertainment industry, although it has declined somewhat since World War II, is still a significant part of the state's economy, while tourism is one of the fastest growing sectors.

The economy of the Inland Southwest is based on mining and ore processing, manufacturing, services, agriculture, and tourism.

Other Potentially Affected Areas

State of Colorado - Colorado's principal industries include manufacturing, government, tourism, agriculture, aerospace, and electronic equipment. The state's largest manufactured goods categories are computer equipment, instruments, foods, machinery, and aerospace products. Primary agricultural products include corn, wheat, hay, fruits, cattle, sheep, hogs, and poultry. Colorado's unemployment rate averaged 5.0 percent in 1991.

State of Wyoming - Wyoming's principal industries are mineral extraction, tourism, and agriculture (primarily wool production). Manufactured goods include refined petroleum products and wood products. The state's leading agricultural crops include wheat, barley, oats, and hay. Wyoming's unemployment rate averaged 5.1 percent in 1991.

State of Nevada - Nevada's primary industries include gaming, tourism, mining, manufacturing, and agriculture. Manufactured goods include gaming devices, chemicals, and aerospace products. Nevada's primary agricultural crops are hay, alfalfa seed, wheat, and barley. The state's unemployment rate averaged 5.5 percent in 1991.

State of New Mexico - The principal industries of New Mexico include government, services, and mining. Manufactured goods include food, lumber, and machinery. The state's main crops are hay, onions, wheat, corn, cotton, cattle, hogs, sheep, and poultry. In 1991, New Mexico's unemployment rate averaged 6.9 percent.

3.3.3 Existing Power System

Pacific Northwest

Hydroelectric projects produce about two-thirds of the total electricity used by the Pacific Northwest. There are 61 major hydroelectric dams in the Pacific Northwest, including 31 federally owned dams with a combined nameplate capacity of approximately 22,000 MW. The Pacific Northwest has five major Federal storage reservoirs behind Libby, Grand Coulee, Albeni Falls, Hungry Horse, and Dworshak Dams. Three Canadian dams (Mica, Keenleyside, and Duncan) also provide substantial water storage for the Columbia River Basin.

The amount of streamflow varies from month to month and from year to year according to weather and other natural conditions. In normal years and years of heavy run-off, water is readily available to produce electricity needed in the Pacific Northwest; when streamflow is down, additional water from the storage projects is released to maintain required flows. In an average year, 16,900 aMW of hydropower is produced and in the 42-month critical period, the hydro system produces about 12,270 aMW.

The amount of run-off in the system is highly variable. The average annual run-off as measured at The Dalles, Oregon, is about 165 cubic kilometers (km3) (134 million acre-feet (MAF)), but it has varied from about 96 km3 (78 MAF) to 239 km3 (194 MAF). The monthly mean natural streamflow at The Dalles has ranged from a low of 1105 m3/sec (39,024 cfs) in winter, to a high of 23,506 m3/sec (830,130 cfs) in the spring.

The total usable storage capacity of the Columbia River system is about 51 km3 (41 MAF), or less than a third of average run-off. About 46 percent of that storage capacity is in Canada. The Canadian portion of the storage is operated by British Columbia Hydro and Power Authority (BC Hydro). The Pacific Northwest and BC Hydro coordinate operation of the hydro system to increase flexibility and to enhance power production.

Coordination of the Pacific Northwest and BC Hydro systems began in 1964 with the ratification of the Columbia River Treaty (Treaty). Under the Treaty, Canada constructed three storage dams in British Columbia. The three

Canadian storage dams enabled downstream U.S. projects to produce up to an additional 2800 MW of dependable capacity.

BC Hydro also built storage on the Columbia River system in excess of that required by the Treaty. This non-Treaty storage includes approximately 6 km3 (5 MAF) of additional usable storage. BC Hydro and BPA have signed a Non-Treaty Storage Agreement, which captures some additional efficiencies due to diversities in loads, resources, and run-off patterns.

Few sites remain in the Pacific Northwest that could effectively accommodate major hydroelectric development. As more power is required, other ways to produce power have been added to the power base. In addition to the hydroelectric system, electricity for the region is also produced at 14 coal units and one commercial nuclear plant.

The Pacific Northwest resource mix also includes energy conservation. The Northwest Power Act directs BPA to give the highest priority to cost-effective energy conservation in acquiring resources to meet load. BPA's conservation programs are designed to improve the efficient use of electricity across all broad end-use categories (residential, commercial, industrial, and agricultural sectors). By improving end-use efficiency, energy conservation offers a means of regulating load growth and offsetting the need for new generating resources.

Pacific Southwest

Half of California's generating capacity consists of oil- and gas-fired power plants. Next is hydro (about 20 percent), followed by nuclear, coal, geothermal, and cogeneration. Investor-owned and municipal utilities, the California Department of Water Resources, and the Western Area Power Administration (a Federal power marketing agency) can generate 45,000 MW with their systems.

The Inland Southwest resource mix includes hydro, coal, gas, oil, and nuclear generation. Coal provides about 58 percent of the region's generating capacity. Oil- and gas-fired generation account for about 26 percent, hydropower produces approximately 17 percent, and the Palo Verde (Arizona) nuclear plants #1 and #2 account for 9.3 percent of the region's installed capacity. As much as 3600 MW of the Inland Southwest's total capacity could be transferred on a firm basis to supply export power to California and other areas in the summertime (Western Systems Coordinating Council, April 1991).

Other Potentially Affected Areas

State of Colorado - Electricity production within Colorado is largely thermal-based.

State of Wyoming - Wyoming's electricity production is almost wholly thermal-based.

State of Nevada - Electricity production in Nevada is largely thermal, followed by hydro.

State of New Mexico - Electricity production in New Mexico is chiefly thermal, followed by hydro.

3.3.4 Demand For Power

Pacific Northwest

Electric loads within the Pacific Northwest vary according to geographic location and season. The Puget Sound-Willamette Valley region, where two-thirds of the population lives, uses the largest amount of electricity, most of it in winter for heating. East of the Cascades, the difference between winter and summer loads is less pronounced in some areas due to summertime irrigation and air conditioning loads. In fact, summertime loads of utilities serving heavy irrigation demands sometimes exceed those utilities' winter loads.

Industrial users account for roughly 40 percent of electric consumption, commercial users for 20 percent, and residential users for over 30 percent. The region's hydro-based power historically has been much less expensive than power from fossil fuels, which are used more in other regions. As a result, residential customers rely on electricity for

space and water heating in the Pacific Northwest more so than in other parts of the country. Although the region uses much less fossil fuel than the rest of the country, residential customers in the region use twice as much electricity for end uses.

Slightly less than half of Pacific Northwest loads are served by BPA, which markets power from U.S. Army Corps of Engineers and Bureau of Reclamation dams and Washington Public Power Supply System Nuclear Plant No. 2. The public utilities and investor-owned utilities (IOUs) sell their own generated power or power from BPA to regional end-use consumers (those who use and do not re-sell the power). BPA's authority stipulates that it serve all requested needs within the region first, and that it supply power to public utilities and cooperatives before IOUs. Only if more power is available than is needed by the region can it be sold and transmitted outside the region.

Demand forecasts in the 1970s anticipated an energy shortage. New generating resources were planned and built into the early 1980s. When demand for electricity did not increase as expected, however, the construction of additional large-scale generating facilities stopped. By 1990, regional demand had almost balanced regional supply. It is not certain whether or not this balanced condition will continue in the future, because there are wide variations in forecasted loads. Under BPA's low and medium-low forecasts, the region could experience surplus conditions for 10 to 20 years. However, the medium, medium-high, and high forecasts place the region in deficit conditions throughout the 20-year study period. (See Figure 3-3.)

Figure 3-3: Regional Firm Energy Surpluses/Deficits Assuming No Resource Acquisitions

SOURCE: Bonneville Power Administration. 1990. Pacific Northwest Loads and Resources Study. Bonneville Power Administration, Division of Resources, Portland, Oregon

PacifiCorp's projected energy needs are illustrated in Table 3-3. Pacifi-Corp's plans for resources indicate a need for capacity of 2000 MW by 2010. (See section 4.4.2.2 for an additional discussion of PacifiCorp's capacity needs.)

Table 3-3: Key PacifiCorp Forecast Information(4)

Forecast	Energy Growth Rate	Total System MWa at 2013	Total MWa Added	Total System MW at 2013	Total MW Added
Low	0.3	5373	328	7504	449
Medium-Low	1.3	6620	1396	9277	1969
Medium	2.1	7998	2645	11,206	3709
Medium-High	3.0	9623	4151	13.488	5782
High	3.8	11,380	5724	15,949	7975

Pacific Southwest

State-wide peaking electricity demand in California in 1992 was 62,115 MW. Roughly 90 percent of this demand was from three IOUs and the two largest municipally owned utilities.

The peak load demands of the Pacific Northwest and California occur at different times. The Pacific Northwest peak demands occur in the winter, and California's peak demands occur in the summer. During the summer, the hydro-based Pacific Northwest and BPA systems tend to have excess capacity, which can be used to help meet California's summer peak demands. California's thermal-based system tends to have excess capacity in the winter, which can help the Pacific Northwest meet its winter peak. Full use of both systems can reduce the need for new resources in each system. BPA currently has several seasonal energy and capacity for energy exchange contracts in effect with a number of California utilities.

The California Energy Commission (CEC) 1992 Electricity Report (ER 92) recommends a balanced set of resource options that include cost-effective energy efficiency savings, gas-fired repowering, efficient new gas plants, renewable resources, and cost-effective purchases from out-of-state that increase the efficiency of use of existing resources throughout the west.

Two of the three IOUs have ample resources to meet their resource needs through the turn of the century. Pacific Gas and Electric (PG&E) expects to have sufficient capacity to meet its reserve margin through 2009. Southern California Edison's (SCE) planning area will have adequate capacity resources to meet its demand through the year 2001. San Diego Gas and Electric (SDG&E) is unable to meet its target reserve in 1993.

One of the two large municipal utilities - Los Angeles Department of Water and Power (LADWP) - has sufficient resources to meet its requirements throughout a 20-year planning period. Sacramento Municipal Utility District (SMUD), on the other hand, will need to add resources to meet its load by 2003. SMUD intends to depend on short-term exchanges with the Pacific Northwest to delay building a new power plant until anticipated load growth appears more certain.The Inland Southwest total generating capacity is expected to be surplus to its needs beyond the year 2009.

3.3.5 BPA Power Rates

BPA provides electric power to its preference public utility customers, to direct service industrial (DSI) customers (primarily aluminum smelters), and to other regional and extra-regional customers. Electric power produced by both public and IOU-owned dams in the Pacific Northwest is relatively inexpensive; thus BPA's wholesale power and regional retail rates have traditionally been low relative to rates in the rest of the United States. Electricity use per customer is higher than the U.S. average, while the overall electricity cost per customer is close to the national average.

BPA rates are set in accordance with directives in the Northwest Power Act. Between 1979 and 1983, rates in the Pacific Northwest rose rapidly. These rate increases were due primarily to the inclusion of costs associated with Washington Public Power Supply System's Nuclear Plants 1, 2, and 3, and costs of programs mandated by the Northwest Power Act. These programs include residential exchange, fish and wildlife, and conservation. Between 1984 and 1993, rates remained relatively stable in nominal terms and declined in real terms (after adjusting for inflation).

On October 1, 1993, BPA increased its rates by 15.7 percent. This increase--the first major increase by BPA in about 10 years--was attributed to a number of extraordinary events, including drought and very cold temperatures through winter 1992, declines in DSI revenues, new resource needs, increased fish and wildlife costs, and transmission system upgrades.

(1)Information for state pollutant levels was taken primarily from the following sources:

Department of Health and Environmental Sciences. 1989. *Montana Air Quality Data & Information Summary for 1987*. Helena, Montana.

Department of Environmental Quality. 1990. 1989 *Oregon Air Quality Annual Report*. Portland, Oregon.

Washington State Department of Ecology. 1989. *Washington State Air Monitoring Data for 1988*. Olympia, Washington.

(2)BPA, 1993. *Resource Programs Final Environmental Impact Statement* (DOE/EIS-0162), Bonneville Power Administration, Portland, Oregon.

(3)Environmental Protection Agency, Region 6, GIS Center, Dallas, Texas, February 23, 1993.

(4)PacifiCorp, 1993. Inputs for RAMPP-3 (in progress).

Chapter 4: Environmental Consequences

4.1 Hydrosystem Impacts Related to the Federal Columbia River Power System

The FCRPS ultimately will be operated in accordance with the decisions that result from the System Operation Review EIS. Until the SOR EIS is completed, FCRPS operations will be consistent with the decisions based on the 1992 Columbia River Salmon Flow Measures Options Analysis/EIS, the 1993 Supplemental EIS, and later supplements, if any, and consultation under the Endangered Species Act. Decisions regarding hydro-system operations and analyses of the environmental impacts of hydrosystem operations are being made in these other forums. (See Chapter 1, sections 1.5.1 and 1.5.3.)

This PacifiCorp Capacity Sale EIS will not focus on changes in hydropower operations, because the PacifiCorp contract is not a decision on particular hydropower operations. Instead, the contract is a system operational obligation to be met with all of the resources at BPA's disposal, including future acquisitions.

This EIS evaluates a range of alternatives and focuses on the mix of resources that may be used. The evaluation of the alternatives considers relying on the hydro system, as well as relying exclusively on thermal resources and/or acquisition of additional resources.

4.2 Methods of Analysis

For impacts related to BPA system resource requirements under Alternative 1, the Proposed Action, analysis was performed on future capacity availability using the *1990 Pacific Northwest Loads and Resources Study* (Whitebook) capacity projections for both medium and high load forecasts (see Appendix D). A high load study would have been sufficient to determine substantial impacts to the environment from use of resources to serve the proposed contract, but it was felt that a medium case was also useful to determine a more balanced analysis. The low load case was not included because the impacts of both the 1100 MW capacity contract and the additional 900 MW did not result in the need for BPA to acquire resources to cover either contract alternative. The Whitebook capacity projections were adjusted for capacity additions from the expected resource acquisitions (from the current Resource Program, specifically, 600 aMW of conservation) to meet energy deficits, and for potential reductions in availability of capacity from the FCRPS that might result from decisions in the SOR EIS. In addition, a cold weather adjustment was applied to account for periods of very cold weather in the Pacific Northwest, which result in high capacity demands. The same technique was applied to analyze future capacity availability under Alternative 3, Larger Capacity Sale, in which the proposed contract is for 2000 MW.

Because a final determination has not been made for potential reductions in availability of capacity from the FCRPS that might result from a decision to reduce hydro capability in the SOR EIS, these studies were used only as a general guide to assess potential outcomes. SOS Case 5(b) (see Appendix E) was selected as a reasonable representation for potential reductions in availability of capacity from the FCRPS. However, other outcomes of the SOR process are possible. Other SOSs being examined in the SOR process (see Appendix E) appear to diminish available capacity from the hydrosystem by large amounts, amounts similar in magnitude to that projected for SOS 5(b), but the decreases sometimes are projected to occur in other months when surplus capacity from the Pacific Southwest is not likely to be available. Therefore, to encompass the range of potential outcomes of the SOR process, this EIS analyzes a range of potential new capacity resource acquisitions from 0 to 1200 MW within which service to the PacifiCorp contract under alternatives 1 and 3 can be assumed.

For impacts related to PacifiCorp's system under alternatives 1, 2, and 3, BPA relied on PacifiCorp's Resource and Market Planning Program reports ("Balanced Planning for Growth." RAMPP-2, 1992, and RAMPP-3, 1993). These documents outline PacifiCorp's plans for resource acquisition.

The impacts of alternatives 4 and 5 are operational in nature and are analyzed qualitatively.

4.3 Summary of Environmental Effects

The alternatives in this EIS could create environmental effects from two sources. The first source is the acquisition (or deferral) of new thermal resources. The siting and building of a thermal power plant could create land effects as well as air and water effects. The second source for environmental effects arises from changes in operation of existing thermal resources, which could lead to air and water effects.

The Proposed Action and Larger Capacity Sale alternatives could lead to deferral of new thermal resources and changes in operation of existing thermal resources and therefore could affect land, air, and water resources. No action would lead to accelerated peaking resource development by PacifiCorp. The remaining two alternatives, Stricter Return Provisions and Variations in Hours of Peak Demand Available, do not change the size of the contract, but alter return conditions and hours of delivery. Therefore, they are less likely to create the need to acquire new thermal resources, but could lead to operational changes in existing thermal resources, and thus create air and water effects.

Figure 4-1: Summary of Environmental Effects for Each Alternative* (*This figure not available in electronic format*)

Each alternative is analyzed separately for its impacts on BPA's and PacifiCorp's power systems. Depending on the alternative, environmental effects may be felt in one system and not in the other. Where the acquisition of a new thermal resource is a possibility, the discussion is necessarily generic as there is no way to determine exactly where in the study area such a resource would be sited.

4.4 Environmental Effects of the Alternatives

4.4.1 Alternative 1: Proposed Action

The long-term contract proposed under Alternative 1 would replace the expired 20-year contract, which had a capacity demand of 1127.3 MW, with a new contract demand of 1100 MW of capacity. The proposed contract would expire August 31, 2011.

(See Chapter 2, section 2.1, for more details.)

4.4.1.1 Impacts Related to BPA's System

Since expiration of the old 20-year contract, capacity sales to PacifiCorp by BPA have continued via short-term arrangements that are essentially identical to the proposed long-term contract. Therefore, there would be no immediate, substantive change if the proposed action were implemented.

Currently, BPA could serve the long-term PacifiCorp capacity contract using capacity available from BPA resources that is surplus to other needs 96 to 98 percent of the time (Whitebook analysis). However, as preference loads grow, capacity that is available on the FCRPS now may be required to serve preference loads later. The issue becomes, what are the future resource implications of entering into the proposed 1100 MW long-term capacity contract with PacifiCorp, and how do those impacts differ from the impacts of other alternatives.

Deliveries

Deliveries are the generation and dispatch of peaking energy to PacifiCorp in amounts equal to their peak demand up to the limits of the proposed capacity contract. Peaking energy means the electric energy associated with the generation and delivery of capacity to PacifiCorp. There is a distinction between energy and capacity. Energy is a given amount of power produced over a period of time, expressed in kilowatthours (KWh) or larger units. Capacity is the instantaneous ability to generate a peak amount of power, expressed in kilowatts (KW) or larger units. It may be

helpful to think of the energy/capacity relationship as being similar to a rental versus a sale, with capacity analogous to a rental, and energy analogous to a sale. With energy, as with a sale, a product is produced and sold to a customer who keeps possession. With capacity, as with a rental, the customer pays for the use of the product, and must return the product (in this case, the energy equivalent) after a specified time.

The analysis (see Appendix D) shows (under the medium load forecast) the long-term 1100 MW PacifiCorp capacity contract (Alternative 1) could be met with expected BPA resources in all but a few winter months under poor water conditions in the later years of the contract. Under the high load forecast (an event having an estimated probability of 5 percent), additional capacity would be required more frequently to meet the contract. BPA would expect to be short of capacity to meet the contract in November through February and in the first portion of April in the later years of the contract. Specifically, beginning around the year 2005, BPA would experience capacity shortages up to approximately 2400 MW under the poorest water conditions and high load growth.

Under this alternative, BPA would need additional capacity to meet the proposed PacifiCorp long-term contract only in the winter months for relatively short periods. BPA would make up this additional capacity with resources beginning with those of lowest cost--conservation acquisitions, efficiency improvements, and purchases from the Pacific Southwest. The California and Inland Southwest energy markets currently are surplus in capacity, and a number of utilities, including San Diego Gas & Electric and Los Angeles Department of Water and Power, are marketing this surplus. This especially is the case in winter, when California and the Inland Southwest market capacity from generation that is not being used to meet air conditioning loads. Therefore, BPA would not have to acquire new capacity resources to serve the contract, thereby avoiding the air, land, and water effects from the siting and building of a new thermal resource. Rather, BPA could meet the contract with economic resources and spot market purchases of capacity from the Pacific Southwest when needed. Such purchases would be delivered to BPA's system via the Intertie.

Purchases of capacity from the Pacific Southwest when needed to serve the PacifiCorp long-term capacity contract are not expected to have significant environmental impacts. The Final EIS on Non-Federal Participation in the AC Intertie (NFP EIS), pages 4-18 through 4-20, analyzed Pacific Southwest environmental effects of a variety of scenarios covering different types of transmission between the two regions. The NFP EIS analysis indicated that Pacific Southwest environmental effects were a function of net interregional transfer over seasons or annually. This is because the principal environmental implications come from the volume of energy generated, primarily from fossil fuel plants. If BPA purchased Pacific Southwest excess capacity to meet the PacifiCorp contract and BPA's other capacity loads, the energy losses would be returned within a short timeframe, such as a week, thereby not greatly changing either BPA or Pacific Southwest total generation.

Returns

Returns are simply the payback to BPA of energy it used to produce the capacity needed by PacifiCorp. The contract uses the term "peaking replacement energy" to express returns. Specifically, for purposes of this contract, peaking replacement energy is the amount of energy PacifiCorp is obligated to return to BPA equal to the electric energy associated with the delivery of surplus firm capacity.

Returns are normally delivered during nonpeak hours. These are called the off-peak or light load hour (LLH) periods. The LLH period is usually defined as the first six and last two hours of each workday including Saturdays, and all day Sundays and holidays.

To accept returns of peaking replacement energy, BPA must simultaneously back off an equivalent amount of energy being generated such that the generation displaced by the returned energy is stored in the system (in effect the returns are now serving a portion of BPA's load.) When an equivalent amount of peaking replacement energy has been returned by the customer to BPA's system, (i.e., within a 168 hour period), BPA is then considered to be "made whole" again with precisely the same energy content (with respect to the peaking contract) that it formerly had.

On occasion, BPA experiences conditions under which accepting returns of peaking replacement energy into its system is difficult. This can occur during conditions of spill and/or extreme light load conditions. For example, BPA sometimes experiences load conditions which are extremely light, (i.e., loads insufficient to meet the minimum

generation requirements mandated by power plant license and/or physical operational characteristics.) These "extreme light load conditions" are infrequent and generally occur during the LLH periods. BPA is most likely to incur these problems with extreme light loads during the LLH periods of late summer/early fall months of August, September, and October. With regard to spill conditions, accepting peaking replacement energy would just add to the energy being spilled, and therefore BPA would not be "made whole" (e.g., as before delivery, the previous 168 hours), and the energy equivalent would be wasted. Aside from the required spills for fish flows, BPA is most likely to incur spill conditions during the late spring months of April, May, and June.

When these conditions arise BPA has several options to compensate for these problems. With respect to the proposed capacity contract, BPA has an option to limit the amount of returned peaking replacement energy by up to either 60 percent or 80 percent of hourly scheduled values, depending on the time of year. These special restrictions are specified in §5(b)(3) and §5(b)(4) of the proposed contract, and would usually be invoked only during the LLH periods. These limitations are designed to cover those times of the year during which BPA is most likely to experience problems in accepting returns of peaking replacement energy. It should be noted that any amount of peaking replacement energy subject to a limitation upon return is rescheduled for payback during a time that BPA has greater operational flexibility, (e.g., during a LLH that has greater operational flexibility, or the shoulder hours of a peak period), thus BPA is eventually "made whole." Limiting the rate of return has the same relative effect on improving the light load condition as if the load were raised (or at least maintaining the present load), thereby preventing or decreasing amounts of controllable spill that would otherwise have occurred. Another option that BPA has to compensate for spill or light load conditions is to increase the load through more direct means such as offering non-firm energy sales or making storage arrangements.

The environmental effects of imposing the special restrictions specified in §5(b)(3) and §5(b)(4) of the proposed contract are considered to be of short duration and pose no potential effect on resource development for either party to the proposed contract. The short-term environmental effects of invoking these restrictions are mainly hydro-related and as such will be dealt with in the SOR in sections relating to hourly flow changes. The impacts to thermal plant operations during periods of special restrictions on returns are minor as generation levels would be maintained at minimum operating levels anyway during periods of extreme light load conditions.

Returns during peak hours are permissible, but unusual. They are sometimes done concurrent with a scheduled peak delivery, a practice allowed by the proposed contract. PacifiCorp has the flexibility to return the peaking energy used during demand periods within 168 hours (7 days) subsequent to the scheduled demand. Thus peaking energy scheduled during one hour must be replaced by 168 hours later. Since the 168-hour period is successively expiring as each hour passes, a rolling return period continuously results. This rolling return may have environmental and economic consequences for both BPA and Pacificorp. PacifiCorp could request peaking demand of sufficient quantity to counter-schedule (simultaneously pay back) the amount of replacement energy needed from the previous 168 hours. Thus, the actual replacement of peaking energy from PacifiCorp's system could be delayed for an additional 168 hours or for as long as PacifiCorp chooses to continue the rolling return. In effect, this defers the time at which PacifiCorp must use its own system to return energy to BPA. During this period a number of conditions may have changed. For example, energy availability and price may have improved, benefiting PacifiCorp. Or available resources may have changed, allowing more marketing flexibility for PacifiCorp. If conditions on BPA's system and its wholesale markets are essentially the same during the rolled return period as when the return was normally expected (within the original 168-hour window), then the impacts on BPA would be inconsequential. However, such rolled return might have a negative effect on BPA when market conditions are not as favorable during the later period, or it might have a positive effect when market conditions are more favorable to BPA or if the returns are delayed to a time when the system is constrained in its ability to handle them. Such impacts were analyzed in depth by BPA during contract negotiation, resulting in a higher contract price to PacifiCorp as compensation for the rolling provision in the contract.

4.4.1.2 Impacts Related to PacifiCorp's System

A similar 20-year capacity contract between BPA and PacifiCorp was executed on August 31, 1971. At its expiration, the contract demand was for 1127.3 MW. Since expiration of this contract, capacity sales to PacifiCorp by BPA have continued with short-term arrangements that are essentially identical to the proposed long-term contract in this alternative. Therefore, there would be no substantive change in capacity service from BPA to PacifiCorp if this

alternative were implemented.

The Preferred Alternative would take advantage of the complementary characteristics of BPA's largely hydro system and PacifiCorp's largely thermal system by maximizing their different peaking characteristics. Specifically, BPA's hydro system produces proportionately large quantities of capacity versus energy, while PacifiCorp's system produces proportionately larger quantities of energy. The sale of surplus capacity to PacifiCorp may allow PacifiCorp to defer construction of new thermal resources that it may otherwise need in the absence of this contract. (See section 4.4.2, which discusses the No Action Alternative.)

The rolling return provision of the proposed contract (see paragraph 4.4.1.1, above) does not come without impact on PacifiCorp's system, since eventually all replacement of energy must be made up, and rolling diminishes the effectiveness of the contract for other purposes. However, it may assist PacifiCorp in getting through a period of unplanned outage until resources are operable once again, or until lower cost purchases are available. Such outages could force PacifiCorp to start up dirtier coal- or oil-fired resources, which could increase air and/or water pollution in their vicinity.

Because rolling larger balances owed to BPA increasingly diminishes the effectiveness of the peaking capability, it increases PacifiCorp's risk from unit outages and wholesale market swings. On the other hand, the ability to roll returns allows PacifiCorp to borrow time either to acquire economical resources or until resource performance is restored.

4.4.2 Alternative 2: No Action

Under the No Action Alternative, BPA would not enter into any long-term capacity sale contract with PacifiCorp. BPA would use the flexibility of its system on an ongoing basis to support additional nonfirm sales, to perform more seasonal storage transactions, and to make short-term spot capacity sales or exchanges, including potential short-term capacity sales to PacifiCorp.

4.4.2.1 Impacts Related to BPA's System

FCRPS operations under the No Action Alternative would be consistent with hydro operations decisions being made in other forums (see section 4.1). BPA would not acquire resources under the No Action Alternative of different types or in different quantities than determined through the Resource Programs EIS and Record of Decision (ROD). BPA resource acquisitions would continue to be driven by load growth and need for future sources of energy. Neither would operation of must-run resources such as WNP-2 be affected. However, operation of some resources may be somewhat different under the No Action Alternative than under the other alternatives because non-hydro FCRPS resources

(i.e., Federal thermals and alternative resources) would be operated to complement a hydro operation that is different from the other alternatives. For example, in a low water year, discretionary operations under the No-Action Alternative may use a Federal thermal resource to generate a portion of the load normally allocated to the FCRPS hydro generators. Energy thus saved by the FCRPS generators would be retained in storage. It is not possible to quantify these differences because the system operation under "no action" cannot be precisely defined.

4.4.2.2 Impacts Related to PacifiCorp's System

Resource Development

While no action on BPA's part has little definable effect on the environment, the No Action Alternative would require PacifiCorp to take action to meet its capacity needs. In the short term, PacifiCorp may attempt to purchase up to 800 aMW (plus

15 percent reserves) of capacity on a short-term basis from BPA. Also in the near term, PacifiCorp might seek to contract with other utilities that have excess capacity, make fewer secondary sales, and operate its coal plants at lower, less efficient levels during off-peak hours. The principal costs of this short-term strategy would be purchased capacity

charges, increased operating cost, and lost wholesale revenues. In the long term, PacifiCorp would need to secure its own resources and/or make long-term capacity arrangements with other utilities to meet its capacity needs. This may include the building of new thermal resources, which, depending on type, could increase air and/or water pollution in addition to land impacts from building.

In the short term, BPA could provide sufficient hydro capability (when available) to market 800 aMW (plus 15 percent reserves) to PacifiCorp from the FCRPS. Such sales would occur within whatever constraints might be applied to the FCRPS through the SOR process and the 1992 Flow EIS and its supplements. Impacts of such short-term sales would be limited to the hydro system and therefore are not addressed in this EIS. BPA would have to decide if such short-term capacity sales to PacifiCorp would be the highest and best use of the FCRPS system before making such sales, and would have to comply with laws giving public utilities and cooperatives preference to such capacity.

In the longer term, PacifiCorp probably would develop resources independent of BPA to meet its capacity need. PacifiCorp plans for resources indicate a need of 900 MW of capacity resources in addition to the 1100 MW long-term capacity contract. In its "Balanced Planning for Growth, Resource and Market Planning Program" (RAMPP-2, PacifiCorp, May 14, 1992), PacifiCorp's action plan included initiating siting and permitting for up to 450 MW of simple-cycle combustion turbine (SCT) resources. An acquisition of 150 MW of peaking resources in Arizona Public Service Company's service area that was called for in RAMPP-2 has already taken place. The RAMPP-2 study was done at a time when the long-term capacity contract with BPA was expected to be for 1400 MW. Therefore, PacifiCorp has a total need for capacity, or peaking, resources within its planning horizon of 2000 MW, of which 1100 MW may come from the proposed BPA long-term capacity contract. If the No Action Alternative were implemented, PacifiCorp would likely need to acquire a total of about 1850 MW of combustion turbine resources in addition to the peaking resources from Arizona Public Service, or about 750 MW more in combustion turbines than if the proposed long-term contract were implemented.

For purposes of the analysis, it was assumed that the gas-fired SCTs that would be installed by PacifiCorp have the air pollutant emission characteristics detailed in tables 2, 3, and 4 of RAMPP-3 (PacifiCorp, Generation Resources, Generation Engineering, April 1993, Revision 1) for large units. Pertinent data from these tables is reproduced in this EIS as Tables 4-1, 4-2, and 4-3. PacifiCorp has also stated that one of the simple-cycle units could be converted to a combined cycle combustion turbine (CCCT) within the lifetime of the contract. Tables 4-1, 4-2, and 4-3 also give emission data for combined cycle units. The expected annual load factors would be 10 to 20 percent for simple-cycle units and 60 to 80 percent for combined cycle units. For the analysis, 20 percent and 60 percent annual load factors were used for simple and combined cycle units, respectively. PacifiCorp would expect to site the first 300 MW (nameplate) of capacity in the western part of their service area. Likely locations would be in southern Oregon near Malin or Klamath Falls; and in south-central Washington/north-central Oregon near the intersection of major natural gas pipelines. After the initial 300 MW of development, future facilities would likely alternate between the aforementioned west-side sites and east-side sites in southwestern Wyoming or northern Utah.

For purposes of analysis, development of the new PacifiCorp capacity resources without the long-term capacity contract with BPA is assumed to occur as shown in Table 4-4.

With the long-term capacity contract, only 750 MW of capacity resource development would need to be undertaken by PacifiCorp. If the contract were implemented, it was assumed for purposes of analysis that future capacity resource development by PacifiCorp would occur as shown in Table 4-5.

Table 4-1: PACIFICORP - RAMPP-3 SUPPLY-SIDE PORTFOLIO: TABLE 2 (Partial) - Oregon/Washington

			Emissions (lb/MWh)			

Options	MW Capacity	Average Net Plant Heat Rate (BTU/kWh)	SO2	Particulate	NOx	CO2
Gas Fired Plants						
Large CCCT	225	7518	0.0043	0.0218	0.6781	1000

Large SCCT	159	11,336	0.0065	0.0329	1.0224	1508

Table 4-2:

PACIFICORP - RAMPP-3 SUPPLY-SIDE PORTFOLIO: TABLE 3 (Partial) - Utah

			Emissions (lb/MWh)			

Options	MW Capacity	Average Net Plant Heat Rate (BTU/kWh)	SO2	Particulate	NOx	CO2
Gas Fired Plants						
Large CCCT	191	7518	0.0043	0.0218	0.6781	1000
Large SCCT	135	11,336	0.0065	0.0329	1.0224	1508

Table 4-3: PACIFICORP - RAMPP-3 SUPPLY-SIDE PORTFOLIO: TABLE 4 (Partial) - Wyoming

			Emissions (lb/MWh)			

Options	MW Capacity	Average Net Plant Heat Rate (BTU/kWh)	SO2	Particulate	NOx	CO2
Gas Fired Plants						
WCC Large CCCT	173	7518	0.0043	0.0218	0.6781	1000
WCT Large SCCT	122	11,336	0.0065	0.0329	1.0224	1508

NOTES, Tables 4-1, 4-2, and 4-3:

1. Combustion turbines assume 25 ppm NOx

2. Emissions based on average as-delivered mountain fuel analysis

3. Plant capacity reflects net MW output rating

4. Natural gas heat rates (HHV) and emissions have been adjusted 5 percent to 7.5 percent based on intermediate/peaking use

The Endangered Species Act of 1973, as amended (16 USC 1536), requires Federal agencies to ensure that their actions do not jeopardize endangered or threatened species or their critical habitats. In compliance with Section 7, BPA requested from the U.S. Fish and Wildlife Service (USFWS) a list of endangered and threatened plant and animal species in the affected environment. This information was provided by the appropriate USFWS Field Offices in Idaho, Montana, Wyoming, Nevada, Oregon, and Washington, and is presented in Appendix B.

Table 4-5 encompasses a total of 750 MW of combustion turbine development, with the numbers of plants distributed as evenly as possible over the four areas in which PacifiCorp indicated they would be likely to site capacity resources.

Assuming development of resources as in Tables 4-4 and 4-5, annual quantities of air pollutant emissions can be computed using emission factors appropriate for the type, size, and location of the resource from Tables 4-1, 4-2, and 4-3. These results are shown in Table 4-6.

Table 4-7 shows the estimated annual quantities of air pollutants which would be produced, by region, if 750 MW of PacifiCorp resource development were to occur as shown in Table 4-5. These quantities represent amounts which may be expected to occur even with implementation of the proposed long-term capacity contract. Tables 4-8 shows the additional amounts of air pollution from PacifiCorp resources which may occur if the proposed long-term contract is not implemented, i.e., under the No Action Alternative relative to the proposal.

Table 4-4: New PacifiCorp Capacity Resource Development Under the No Action Alternative

Malin/Klamath Falls Area	North-central Oregon/ South-central Washington	Northern Utah	Southwestern Wyoming
Plant 1: 159 MW SCT	Plant 2: 159 MW SCT	Plant 3: 135 MW SCT	Plant 4: 122 MW SCT
Plant 5: 159 MW SCT	Plant 6: 159 MW SCT	Plant 7: 135 MW SCT	Plant 8: 122 MW SCT
Plant 9: 159 MW SCT	Plant 10: 159 MW SCT	Plant 11: 135 MW SCT	Plant 12: 122 MW SCT
Upgrade to CCCT, 66 MW1/	Plant 13: 59 MW SCT2/		

1/ One of the previous plants constructed in the Malin/Klamath Falls area is upgraded to a combined cycle facility, increasing its capacity to 225 MW.

2/ Balance needed to make 1850 MW. In actuality, another large, 159 aMW SCT would likely be constructed, since a large unit would be more efficient, but only 59 MW can be attributed to the need for capacity projected. In the analysis, the impacts of this unit were prorated, with 37 percent of the impacts being included with the impacts of no action.

Table 4-5: New PacifiCorp Capacity Resource Development Assuming Implementation of the Proposed Long-Term Capacity Contract With BPA

Malin/ Klamath Falls Area	North-central Oregon/ South-central Washington	Northern Utah	Southwestern Wyoming
Plant 1: 159 MW SCT	Plant 2: 159 MW SCT	Plant 3: 135 MW SCT	Plant 4: 122 MW SCT
Upgrade to CCCT, 66 MW1/	Plant 5 109 MW SCT2/		

1/ One of the previous plants constructed in the Malin/Klamath Falls area is upgraded to a combined cycle facility, increasing its capacity to 225 MW.

2/ Balance needed to make 750 MW. In actuality, another large, 159 aMW SCT would likely be constructed, since a large unit would be more efficient, but only 109 MW can be attributed to the need for capacity projected. In the analysis, the impacts of this unit were prorated, with 69 percent of the impacts being included with resource impacts that would occur from PacifiCorp capacity resource development, even with the proposed 1100 MW BPA contract.

Table 4-6: Annual Emissions (Tons/Year) From 1850 Megawatts of PacifiCorp Capacity Resources by Area

Pollutant	Malin/ Klamath Falls Area	North-central Oregon/ South-central Washington	Northern Utah	South-western Wyoming	Total

Sulfur Dioxide	2.90	3.05	2.31	2.08	10.3
Particulate	14.7	15.4	11.7	12.6	54.4
NOx	457	480	363	328	1628
Carbon Dioxide	681,000	708,000	535,000	483,000	2,407,000

Table 4-7: Annual Emissions (Tons/Year) From 750 Megawatts of PacifiCorp Capacity Resources by Area

Pollutant	Malin/ Klamath Falls Area	North-central Oregon/ South-central Washington	Northern Utah	South-western Wyoming	Total
Sulfur Dioxide	2.54	1.53	0.77	0.46	5.30
Particulate	12.9	7.72	3.89	2.33	26.8
NOx	401	240	121	72.5	834
Carbon Dioxide	591,000	354,000	178,000	107,000	1,230,000

Table 4-8: Increase in Annual Emissions (Tons/Year) by Area With No Action Relative to the Proposed Contract

Pollutant	Malin/ Klamath Falls Area	North-central Oregon/ South-central Washington	Northern Utah	South-western Wyoming	Total
Sulfur Dioxide	0.36	1.52	1.54	1.62	5.0
Particulate	1.8	7.68	7.81	10.27	27.6
NOx	56	240	242	255.5	794
Carbon Dioxide	90,000	354,000	357,000	376,000	1,177,000

Information about other types of environmental impacts for CTs is available in the Resource Programs Final EIS (Final Environmental Impact Statement, Resource Programs, Vol. 1, Environmental Analysis, Chapter 3, pp. 3-58 through 3-64). Impacts relating to the extraction and transportation of natural gas, which serves as fuel for the facilities, and are not specific to the site of the plant (i.e., they generally occur off site) are shown in

Table 4-9.

PacifiCorp is investigating the use of peak management techniques that may reduce the need for peaking generation. (PacifiCorp, Peak Management, October 29, 1993, prepared by Carole Rockney and Bruce Werner.) Recommendations for implementing peak management techniques include (1) investigating and implementing system efficiency improvements; (2) investigating new generation pumped storage technology; (3) demand-side programs, including energy conservation, investigation of load control options through pilot tests, and study of targeted, local area direct load control in areas where transmission and distribution capacity are constrained; and, (4) studying, offering, and promoting pricing mechanisms to better reflect time-of-day costs. To the extent that these efforts may reduce peak load, the need for combustion turbine generation, and the environmental impacts thereof as described above, could also be reduced under either the no action alternative or the proposed capacity contract. Impacts of load management techniques and customer system efficiency improvements are discussed in the Resource Programs Final EIS, Vol. 1,

pp. 3-87 through 3-91. Load management techniques are generally viewed as environmentally benign. Customer system efficiency improvements may have some environmental effects related to potential improper disposal of old, inefficient transformers, effects on land use and habitat when the efficiency improvement involves construction, such as when an old, inefficient substation is replaced with a new one at a different site, and potential for changes in electromagnetic fields effects from facilities. However, these can only be evaluated on a site-specific basis.

From the perspective of impacts to new resource development and operation, the No Action Alternative has more environmental consequences, since No Action would be projected to result in construction and operation of eight additional combustion turbine facilities. The impacts on air quality would be tempered by the fact that the facilities would be required to meet air quality regulations designed to protect human health and welfare. The primary air quality impact therefore may be a reduction in future opportunities to locate other facilities that produce air pollution in those areas, as specified in Tables 4.4 and 4.5, where PacifiCorp would be likely to site facilities. Other impacts from the construction of resources under the No Action Alternative probably would be minor. The combustion turbine facilities

Table 4-9: Impacts Relative to Natural Gas Production and Transportation for

1850 Megawatt and 750 Megawatts of PacifiCorp Capacity Resources

	1850 MW		**750 MW**	
Estimated Impacts	**On-Shore Gas Extraction**	**Gas Transportation1/**	**On-Shore Gas Extraction**	**Gas Transportation**1/
Air Pollutants				
Oxides of Sulfur tons/year	594	0.250	279	0.117
Oxides of Nitrogen, tons/year	35.0	166	16.4	78.0
Particulates, tons/year	0.81		0.38	
Water Pollutant Discharges				
Biological Oxygen Demand, tons/year	0.69		0.32	
Chemical Oxygen Demand, tons/year	4.63		2.17	
Oil & Grease, tons/year	14.2		6.69	
Chromium, tons/year	0.038		0.018	
Zinc, tons/year	0.013		0.0059	
Total Dissolved Solids, tons/year	191		89.5	
Chloride, tons/year	35.6		16.7	
Sulfate, tons/year	28.8		13.5	
Land Effects				

Acreage Requirements per year	15.6 permanent, 20.0 temporary	2613	7.3 permanent, 9.4 temporary	1226

Solid Wastes				
Drill Cuttings, tons/year	1400		657	
Drilling Mud, acre/ft.	3.63		1.70	

Employment				
Construction, employee/years	18.1	281	8.51	132
Operations, employees per year	1.81	8.13	0.88	3.81

Occupational Safety & Health				
O & M Injuries per year	4.8x10-5 to 1.4x10-3	6.6x10-5 to 1.1x10-4	2.3x10-5 to 6.4x10-4	3.1x10-5 to 5.0x10-5
O & M Deaths per year	5.6x10-7 to 1.4x10-5	2.3x10-7 to 1.9x10-6	2.6x10-7 to 6.5x10-6	8.8x10-8 to 8.8x10-7

1/ For gas transportation, data missing in the columns are either not relevant to that activity, or factors to compute the relevant value are not provided in the Resource Programs Final EIS.

probably would be sited in areas zoned for industrial use and combustion turbine facilities do not require large amounts of land or water. Noise from combustion turbine facilities can be a concern, but the facilities are likely to be muffled to meet noise standards, and are not likely to be very near noise-sensitive properties. Ultimately, however, the impacts of potential combustion turbine development by PacifiCorp under the No Action Alternative, or the proposal for that matter, are highly site-specific and can not be identified precisely without knowing the actual sites or more about the particular characteristics of the facilities as they would be built. Therefore, some types of impacts, such as impacts on cultural resources, aesthetics, recreation, threatened or endangered species, etc., cannot be identified at this level of analysis. Such impacts would be a consideration in the siting and licensing processes for the generating facilities, and may be precluded or mitigated as a result.

Air emissions from existing and new power plants may impair vegetation as discussed in BPA's Resource Programs EIS, Volume II, Appendix F, Section 8. Other direct effects to vegetation are to be expected with the development of energy facilities such as new plants, transmission lines, or substations. Predicting such impacts is beyond the scope of this document, since locations of such facilities cannot be defined.

However, some impacts of the No Action alternative are not site-specific. Global warming, for example, is not site-specific, since it is a cumulative effect of worldwide releases of greenhouse gases. The No Action Alternative is of greater concern than the other alternatives from the perspective of global warming, since more carbon dioxide would result. The No Action Alternative would also require more fuel, primarily natural gas, a depletable natural resource, and would result in greater impacts from the infra-structure needed to supply it.

Operational Changes Related to Other PacifiCorp Resources

PacifiCorp expects to use the contract to shape about 2.7 million MWh of generation per year from off-peak to on-peak. Even without a firm contract under the No Action Alternative, PacifiCorp intends to use short-term and non-firm BPA capacity in a similar fashion (to the extent that capacity is available and usable).

In the worst case for PacifiCorp, it would not get any BPA short-term capacity and would have to provide substantial amounts of on-peak generation with combustion turbines. In this scenario, thermal units would have to be backed down in the off-peak hours. The first resources to be displaced (both with and without the contract) include Gadsby and the new SCTs. In the early years, the second resource to be displaced would be the higher-cost coal plants, e.g., Centralia, Naughton, and Cholla. As the CCCTs are added, they become the second group of resources to be displaced, and the coal plants would be third. As noted above, the bulk of the impact is on the baseload resources, i.e., the CCCTs and coal plants.

PacifiCorp expects competition for BPA's non-firm capacity to be most intense from mid-December to mid-February. The following describes the impact on system operation when PacifiCorp is unsuccessful in acquiring BPA's non-firm capacity.

Without the contract, there would be an increase in energy from unusable off-peak thermal generation that was previously shaped to peak hours. More energy would be generated on-peak by the new resources that PacifiCorp acquires. In the near term, the off-peak energy would be "trapped" at the coal plants, resulting in lower production factors. (PacifiCorp's coal plants have one of the highest production factors in the industry.) As new resources are acquired to cover the growth in load, the "trapped" energy would shift to the new resources with their higher incremental cost.

There would be an increased use of thermal plants to serve short-term peaking needs. In the near term, these plants would be other utilities' older oil and gas-fired boilers or combustion turbines, which produce higher emissions than newer and cleaner thermal plants. For example, PacifiCorp has secondary rights to combustion turbines with Black Hills Power & Light and with Arizona Public Service. Eventually, this peaking requirement would be served by more efficient new SCTs.

There would also be a shift in PacifiCorp's ability to displace other utilities' high-cost thermal. There would be fewer on-peak hours and more off-peak hours with surplus energy. Since the assumption is that without the contract with PacifiCorp, BPA would sell the same capacity and storage in the non-firm market, there should be a complementary shift in some other utility's surplus energy.

4.4.3 Alternative 3: Larger Capacity Sale

Under this alternative, BPA would contract for amounts up to an additional 900 MW of contract demand with PacifiCorp and/or other utilities under terms similar to the proposed contract. Based on current forecasts, BPA could serve an additional 900 MW by using surplus capacity that is available from BPA resources. However, FCRPS operations may be redefined in the SOR process (see section 4.1), and interim annual operating schemes being formulated through supplements to the 1992 Flow EIS. In addition, as preference loads grow, capacity that is now available on the FCRPS may be required to serve preference loads later. The issue for this alternative is what are the future resource implications of contracting to supply PacifiCorp and/or other utilities with up to a total of 2000 MW of capacity.

4.4.3.1 Impacts Related to BPA's System

Whether the entire 2000 MW is delivered to PacifiCorp, or whether the additional amounts up to 900 MW of capacity are delivered to other utilities, the impacts on BPA's system are essentially the same. BPA applied the same analytical technique used for the proposed contract to assess future capacity availability to serve a contract for an additional amount up to 900 MW of capacity. (See section 4.2 and Appendix D.)

The analysis assumed poor water conditions and a medium load forecast. The results of this analysis show that a long-term

2000 MW capacity sale (the initial 1100 MW PacifiCorp contract plus an additional 900 MW) could be met with expected BPA resources 90 percent or more of the time in all months of the year except February, March, and April. In these months, BPA could meet a 2000 MW contract approximately 80 percent of the time. In years where these water

conditions prevailed and for these months, BPA would need to acquire capacity to serve the contract, probably by purchasing from the Pacific Southwest. Alternatively, BPA could choose to acquire the output of a thermal resource to serve the contract under the above conditions.

A second analysis was conducted assuming the same poor water conditions and a high load forecast. Under this scenario, BPA could serve a 2000 MW capacity contract (the initial 1100 MW contract plus the additional 900 MW of capacity) with expected resources 90 percent or more of the time in all months of the year except February, March, April, and November. In these months, BPA could meet the contract 60 to 80 percent of the time. Again, BPA would need to acquire capacity to serve the contract in these months, probably by purchasing from the Pacific Southwest. Under these conditions, where less of the contract could be met with available resources, it could be cost effective for BPA to acquire the output of a resource to serve this contract and forecasted future load growth. Should the long-term outlook warrant such a decision, BPA could implement the 5-year notification of recall provision (as provided in §7(b)(1) of the proposed contract).

4.4.3.2 Impacts Related to PacifiCorp's System

With additional contract demand above 1100 MW, PacifiCorp's need for capacity resources would be proportionately reduced.

With a capacity contract for 2000 MW (the initial 1100 MW contract plus the additional 900 MW of capacity), PacifiCorp's planned summer capacity needs would be met through the term of the proposed contract. PacifiCorp would not need to develop capacity resources of its own for that period. The development of the 1100 MW of SCT resources as described for the No Action Alternative (see section 4.4.2) would not occur, and the developmental and operational environmental impacts related to these facilities and described in section 4.4.2 would not take place. Nor would the additional 450 MW of SCT resources projected by PacifiCorp to be needed by 1998 be developed, saving the environmental impacts of the development of these resources.

If BPA contracts for all or part of the additional 900 MW to other utilities, specific environmental effects are hard to assess. It is reasonable to adopt the assumption that PacifiCorp is typical of most utilities in their resource portfolios and development. Therefore, if the 900 MW of capacity were marketed to other Pacific Northwest entities, the pattern of displacement of thermal resource use and development would be similar.

4.4.4 Alternative 4: Stricter Return Provisions

This alternative is the same as the Proposed Action except BPA would be allowed to unilaterally impose stricter return of peaking replacement energy provisions. In lieu of the 168-hour return in the proposed contract (§5(b)(1)), BPA could either: (1) require a 24-hour return, or (2) impose an end-of-week return deadline whereby all peaking replacement energy must be returned by the 2400 hour on Sunday. These return provisions are different from the return provisions under the proposed action and as such have less value to PacifiCorp because this tends to degrade the operating flexibility of the proposed contract.

In order to facilitate these types of capacity sales, BPA would still operate and utilize flexibility's of the FCRPS in accordance with its existing operational criteria and limitations. Therefore, any capacity sale and its return provisions (whether a 24-hour return, 168-hour return, or end-of-week return) would not cause the system to be operated inconsistently with the normal operational limits of the FCRPS.

4.4.4.1 Impacts Related to BPA's System

Under certain extreme system conditions (e.g., cold snap and/or extended WNP-2 outage combined with critical water year flows), any capacity product sold on a firm, long-term basis might require BPA to acquire off-system purchases during some winter months. The probability of this situation occurring is difficult to determine; however, overall revenues from the capacity sale should outweigh any risks associated with these off-system purchases.

24-Hour Return Provision

Under the 24-hour return scenario, PacifiCorp would have up to 24 hours to make returns on all peaking energy (the electric energy associated with the delivery of surplus firm capacity) taken from BPA. This is markedly different from the typical operating strategy associated with the 168-hour return in the proposed contract, in which PacifiCorp may choose to defer some returns until the weekend or later. As a result, BPA would not experience an increasing energy debt balance throughout the weekdays followed by replacement over the weekends and holidays. This scenario provides the most certainty for operational planning purposes for BPA's system. By having greater control of its loads, BPA could achieve greater efficiencies in the use of its resources. This may translate to lower production cost and improved availability factor (measure of a resource's in-service/out-of-service ratio). These efficiencies could have environmental benefits for BPA, such as improved air and water quality. However, because this provision severely restricts PacifiCorp's operational flexibility compared to the proposed contract, it would likely result in the need to renegotiate the pricing structure, resulting in a revenue reduction for BPA.

End-of-Week Return (Sunday Deadline) Provision

PacifiCorp desires more operating flexibility than the 24-hour return provision allows. The end-of-week scenario would require that all peaking energy taken by PacifiCorp during a Monday-to-Sunday week be returned to BPA by Sunday midnight. This arrangement would provide additional flexibility over the 24-hour return provision, but would eliminate the rolling return capability under the proposed contract, as discussed in section 4.4.1.1.

The elimination of the rolling return capability would mean that return of peaking energy could not be deferred into the next week or subsequent weeks. Therefore, BPA could always plan system operations assuming that it would be in energy balance by the end of each week.

Under this arrangement, BPA would benefit over the proposed sale by gaining improved week-to-week certainty in planning and in reduced economic exposure under certain system conditions. BPA's revenues from an end-of-week return scenario, although less than the proposed sale, would be greater than the 24-hour return scenario.

4.4.4.2 Impacts Related to PacifiCorp's System

24-Hour Return Provision

A 24-hour return for peaking replacement energy means that capacity generally delivered to PacifiCorp during the daytime heavy load hours (HLH) generally is returned that night in the light load hours. In this mode, the contract would perform as a firm

24-hour load-factoring service, not unlike the firm storage service often offered by BPA. Under an abnormal condition on PacifiCorp's system (e.g., loss of thermal or transmission resources), it is likely that peaking energy might be taken in all hours one day, then returned all during the next day from other resources. In this mode, the energy would simply be borrowed today for return tomorrow. In either case, this service offers PacifiCorp no assistance in meeting a cold snap or a multiple-day resource outage. PacifiCorp has very little need for a 24-hour return service and would likely value it considerably lower than the proposed contract.

End-of-Week Return (Sunday Deadline) Provision

Under the end-of-week return scenario, the peaking energy return balance must be zero each Sunday midnight. This means that PacifiCorp could make no peaking energy returns during the Monday early morning LLH period, probably resulting in reduced thermal generation during these periods. This condition would not exist on the other days of the week, since peaking energy could be returned for capacity deliveries taken on the prior day. Further, PacifiCorp routinely requires peaking energy during Sunday daytime to meet system requirements. Utilization of capacity on Sundays under this option would necessarily be limited to that which could be returned by midnight that same day.

PacifiCorp requires the rolling return capability to cover forced thermal and/or transmission outages, which are

unpredictable and can leave PacifiCorp deficient for periods extending for a few days or longer. During such periods, returning all the energy to BPA by a specified deadline would be very difficult, while deferral of returns allows PacifiCorp to recover its system before BPA must be made whole again.

While PacifiCorp would see increased flexibility versus the

24-hour return arrangement, an end-of-week return product would have significantly reduced value in meeting their system needs because it provides only very limited capacity coverage for unit outages on weekends and for other system requirements.

Cumulatively, this would result in significantly fewer capacity transactions with PacifiCorp compared to the proposed action. To the extent that these transactions involve thermal resources, impacts to air quality and perhaps land use related to new resource development may be reduced.

4.4.5 Alternative 5: Variations in Hours of Peak Demand Available

The proposed contract allows up to 50 hours of peak demand. Under this alternative, BPA would extend the number of hours of peak demand, thereby making a greater amount of peaking energy available to PacifiCorp each day and each week, while keeping the contract demand limit the same as in the proposed contract. Variations of less than the proposed contract would have impacts of lesser severity.

This alternative, by necessity, also relaxes some terms of the proposed contract. Specifically, the restrictions on return of peaking replacement energy in March through October as stated in §5(b)(3) and §5(b)(4) of the proposed contract would be eliminated. This is a practical measure made necessary because of the difficulty that PacifiCorp would otherwise experience in making returns of replacement energy within the off-peak periods due to the magnitude of peaking energy available under this alternative.

For example, if it could be assumed that BPA increased the number of hours of peak demand to 72 hours, a common hourly amount requested by some BPA customers, the amount of peaking energy available to PacifiCorp would then be an amount equal to the proposed contract demand of 1100 MW times 72 peak hours. Total peaking energy would thus be 79,200 MWh. Incurring an obligation to return this magnitude of peaking replacement energy in other than peak hours would be difficult for both the customer and for BPA. A peak demand stretched to 72 hours is more suitable, from an environmental perspective, for smaller capacity contracts of, say less than 200-300 MW of peak demand. Small peak demand contracts are less operationally significant relative to BPA's overall capabilities, and therefore pose little or no effect to BPA's load shape. Larger peak demand contracts, of the magnitude of the proposed action with PacifiCorp, are of greater concern when coupled with the capability to make up to 72 hours of peak demands because of their potential to affect the load shape in a manner that may cause radical load swings that are potentially harmful to the system. This is of greatest concern during the transitional periods between the peak load period and the off-peak period. Full utilization of a capacity contract with 72 hours of peak demand would have only 96 hours (within the 168 hour payback period) to repay the peaking obligation. Note that 72 of this 96 hours represents the commonly defined LLH during a 168 hour week (See the definition for light load hours in

Chapter 7.) Since, by definition, the LLH periods are hours other than the HLH, the customer in this situation would have a little more than half of the 168 hour period during which to return the peaking energy replacement Thus, a customer fully utilizing a capacity contract with 72 hours of peak demand would need to begin making returns of peaking replacement energy immediately after the HLH period, sometimes within the hour, after having just accepted a peak delivery of capacity during a preceding HLH. For capacity contracts with relatively small peak demand limits relative to their system capabilities this may not be operationally significant, but capacity contracts with large peak demand limits may experience operational problems. The consequence of transitioning magnified load swings from large amounts of capacity deliveries to large amounts of returns in a short time span is a whip-sawing effect on both parties systems in a manner not consistent with normal operational practices The load swings for both the customer and for BPA during these transition periods would be abrupt and inconvenient at best, and perhaps harmful at worst. This may have consequential short duration environmental concerns for fish and wildlife, water quality, recreation, navigation, and the like. These short duration load swings are mainly hydro-related for BPA and as such will be dealt

with in the SOR in sections relating to hourly flow changes.

4.4.5.1 Impacts Related to BPA's System

Peaking energy returned in LLH varies in value depending on time of year and time of week. For example, peaking energy returned in January LLH during a cold spell is more valuable than the same energy returned in May or June LLH when weather is mild and the hydro system is experiencing spring runoffs. Alternatively, loads in the months of late August and September are traditionally the lightest of the year, so problems associated with minimum generation during the LLH period are more likely during this period.

Therefore, the increase in the return of peaking energy from 55,000 MWh to as much as 79,200 MWh makes this return energy less valuable to BPA during periods when BPA has extreme light load conditions and is energy surplus. Since this alternative does not alter the contract demand or price of capacity, BPA is made less whole when it cannot accept returned peaking energy.

Increased returns of peaking replacement energy can sometimes be a problem purely due to economic considerations. For example, BPA may be in a situation where it must purchase energy (as it was during the winter cold-snap in the later months of 1992 and early months of 1993), and make concurrent restrictions on amounts of peaking energy replacement being returned to BPA because of minimum generation problems. The restricted amounts of peaking energy replacement then must be rescheduled for return during other hours. This problem arises during such periods whenever BPA is making LLH purchases of needed energy when prices are lowest, but could be prevented from purchasing all the energy that the Federal system would otherwise be able to accept due to minimum generation problems on the FCRPS. Minimum generation problems in this case are caused by the competition of incoming energy purchases (that have the effect of reducing FCRPS generators to their lowest allowable levels) and simultaneous incoming peaking replacement energy being returned to BPA. Purchases must take priority in this case because of the economic considerations and the fact that returns can be made during other hours. The environmental impacts to BPA associated with the operation of the contract in this situation are caused from assumed decreases in Federal generation levels during peak or shoulder peak periods, as the deferred peaking replacement energy is returned to BPA. To the extent that this generation is from a thermal resource, the emissions would be less during this same period. However, overall emissions would remain the same, as only the time period for returns has changed, not the obligation to return peaking energy.

4.4.5.2 Impacts Related to PacifiCorp's System

By increasing the number of hours of peak demand, PacifiCorp, under this alternative, could serve more of its peak loads, thereby deferring the need to develop and/or operate higher priced thermal resources that may be more environmentally damaging.

On the other hand, if PacifiCorp took advantage of an increase in the number of hours of peak demand, it would have to stand ready to make up to 79,200 MWh of peaking energy returns. This would require increased operations of their resources or additional purchases. If these purchases or operations are from thermal units, then this would result in longer hours of emissions in a given week. Additionally, increased resource operations may need to be done during periods when they otherwise would not be in operation. This may impact other scheduling considerations.

4.5 Cumulative Impacts

Cumulative impacts related to the range of alternatives considered in this EIS are mostly associated with the No Action Alternative. This section deals with these impacts for all the alternatives.

4.5.1 No Action Alternative

There are identifiable cumulative impacts associated with the No Action Alternative, since PacifiCorp would likely undertake substantial resource development to meet their capacity needs. However, it is impossible to address some

cumulative impacts definitively because it is not known precisely where these resources would be built.

Global warming is a cumulative impact that can be addressed on a non-site-specific basis. It is caused by worldwide releases of carbon dioxide and other greenhouse gases, and would be accelerated by the operation of new resources, since they would result in additional carbon dioxide releases.

The need for additional generation resources by PacifiCorp under the No Action Alternative would increase competition for sites for generating facilities. These may occur because of interactions with air pollutants produced by power generating projects, including perhaps some from which BPA may acquire power. There may be similar interactions with pollutants from industrial and commercial developments, increases in traffic, and other facets of continued economic development. There would be cumulative impacts on air quality in the vicinity of the resources which would be developed. Ambient air quality standards and rules for the prevention of significant air quality deterioration would be approached or reached sooner with no action in the vicinities of the resources which would be developed.

Consumption of resources, particularly natural gas, is also a cumulative impact, since many other activities consume the same resources as would the construction and operation of the generating facilities PacifiCorp would need under the No Action Alternative.

4.5.2 Other Alternatives

The other alternatives analyzed in this EIS do not have the generating resource development implications of the No Action Alternative. Although some additional resources may be required to support the contract at times of shortage of capacity from BPA's system, these would most likely be secured from purchases from existing resources in California, and new resources are not likely to be built. To the extent some resources in California might sometimes be operated to meet a BPA purchase, there may be small cumulative impacts related to air quality, global warming, and fuel consumption, but these would be expected to be negligible.

The Larger Capacity Sale Alternative may preclude or defer some additional generating resource development, and may, therefore, result in a reduction, relative to the proposal, in cumulative impacts of the types generally described in section 4.5.1.

Use of BPA resources to serve the contract, or to provide capacity in accord with any of the other alternatives analyzed, will contribute to the overall effects associated with BPA's system. However, these effects are beyond the scope of this EIS since the decision on the PacifiCorp contract is not a decision on FCRPS operations; these decisions are taking place in the SOR process. (See section 4.1.)

4.6 Endangered and Threatened Species and Critical Habitat

The Endangered Species Act of 1973, as amended (16 USC 1536), requires Federal agencies to ensure that their actions do not jeopardize endangered or threatened species or their critical habitats. In compliance with Section 7, BPA requested from the U.S. Fish and Wildlife Service (USFWS) a list of endangered and threatened plant and animal species in the affected environment. This information was provided by the appropriate USFWS Field Offices in Oregon, Washington, Idaho, Montana, Wyoming, Nevada, California, Arizona, New Mexico, Colorado, and Arizona, and is presented in Appendix B.

Consultations regarding the effects of Federal hydropower operations on endangered or threatened Columbia River salmon species are done on the annual operating plans prepared by BPA, the Corps of Engineers, and the U.S. Bureau of Reclamation. BPA's actions to implement power-related activities such as the capacity sale alternatives studied here will not conflict with the outcomes of such Endangered Species Act consultations and no specific consultation is therefore planned on these alternatives.

Chapter 5: List of Preparers

Name	EIS Responsibility	Qualifications
Michael Ary	Program Manager	B.S., Physical Geography. BPA -13 years: Power Operations - 9 years; California Market Analyst - 2 years; Work for Environmental Coordinator - 2 years.
Gery Bolden	Economic Analysis	B.S., Electronic Engineering. BPA - 12 years; Electrical Engineer Contracts and Rates.
Jan Brady	Economist	M.S., Applied Economics; B.S., Economics. BPA 3 - years, Prepared economic analysis of PacifiCorp EIS; assisted in preparation of Resource Programs EIS; Economic analysis of long-term surplus sales contracts.
Carol Brodsky	Writer/Editor	B.A., Journalism. BPA - 5 years (contractor). Writer/editor for PNW Loads & Resources Studies; PNW Long-Term Forecasts; Power Sales Contracts EIS; Resource Programs EIS, other projects.
Kathy Craig	PSW Market Analysis	BPA - 13 years: Resource Planning - 7 years; California Market Analysis - 6 years.
Maureen Flynn	Former Project Manager	J.D., 1979; B.S., Psychology. BPA - 13 years: Power Management and Environmental Review.

Name	EIS Responsibility	Qualifications
Tim Hein	Contract Interpretations	M.S., Electrical Engineering; B.S., Engineering Science. BPA - 26 years: Contracts and Rates, Negotiating Contracts - 14 years, Communications Branch, Engineering - 10 years.
Byrne Lovell	Technical Assistant	M.S., Counseling; B.A., Mathematics. BPA - 9 years: Supervisory Mathematician - 3 years; Mathematic modeling - 6 years.
Bruce MacKay	Former Project Manager	B.S., Physics. BPA - 13 years: Chief, Water Management Branch - 2 years; Chief, Sales Support Section - 3 years; Chief, Modeling Section - 3 years.
Bob Neal	Technical Assistant	B.S., Physics. BPA 17 - years: Power Operations - 10 years; System Planning - 7 years.
Jim Sapp	Technical Assistant	Ph.D., Systems Science; M.A., Communications; B.A., Mathe-matics. BPA - 13 years: Division of Resource Planning - 2 1/2- years; Forecasting - 10 years.

Al Schaller	Alternatives	B.A., English Literature; M.S., Economics. BPA - 13 years: Power Supply, Section Chief; Contract Development - 3 years; Contracts and Rates - 3 years; Transmission Rates - 4 years.
Randy D. Seiffert	Thermal Resource Impacts	B.S., Chemical Engineering. BPA - 18 years, Environmental Analysis.
Ralph Stein	Chairman, BPA Capacity Team	B.S., Mathematics. BPA - 25 years: Office of Energy Resources, Section Chief, Loads and Resources - 18 years.

Name	**EIS Responsibility**	**Qualifications**
Spencer Wedlund	Economic and Marketing Analysis	M.A., Economics; B.A., Economics. BPA Sales and Revenue Forecasting - 13 years; Contract Negotiator - 2 years.
Don Wolfe	EIS Planning and Strategy Guidance	J.D.; B.A., Psychology. BPA - 11 years: Environmental Analysis - 8 years; Power Sales Contracts - 3 years.

    

Chapter 6: List of Agencies, Organizations, and Persons to Whom Copies of the Statement Are Sent

FEDERAL AGENCIES

U.S. Army Corps of Engineers, Portland, OR

U.S. Army Corps of Engineers, Seattle, WA

U.S. Army Corps of Engineers, Walla Walla, WA

U.S. Department of Energy, Bonneville Power Administration, Idaho Falls, ID

U.S. Department of Energy, Bonneville Power Administration, Portland, OR

U.S. Department of Energy, Federal Energy Regulatory Commission, Washington, DC

U.S. Department of Energy, Western Area Power Administration, Sacramento, CA

U.S. Department of Energy, Western Area Power Administration, Golden, CO

U.S. Department of Energy, Western Area Power Administration. Billings, MT

U.S. Department of Interior, Bureau of Indian Affairs, Portland, OR

U.S. Department of Interior, Bureau of Reclamation, Ephrata, WA

U.S. Department of Interior, Fish and Wildlife Service, Boise, ID

U.S. Department of Interior, Fish and Wildlife Service, Olympia, WA

U.S. Department of Interior, Fish and Wildlife Service, Helena, MT

U.S. Department of Interior, Fish and Wildlife Service, Portland, OR

U.S. Department of Interior, Fish and Wildlife Service, Vancouver, WA

U.S. Department of Interior, Fish and Wildlife Service, Cheyenne, WY

U.S. Department of Interior, National Park Service, Coulee Dam, WA

STATE OF ARIZONA

Governor's Office, Executive Assistant, Phoenix, AZ

Department of Parks, Phoenix, AZ

STATE OF CALIFORNIA

California Energy Commission, Sacramento, CA

Department of Parks and Recreation, Office of Historic Preservation, Sacramento, CA

Public Utilities Commission, San Francisco, CA

Office of Permit Assistance, Governor's Office of Planning and Research, Sacramento, CA

STATE OF COLORADO

Colorado Historic Society, Denver, CO

Colorado State Clearinghouse, Denver, CO

STATE OF IDAHO

Idaho State Historical Society, Boise, ID

Department of Health and Welfare, Boise, ID

Historic Preservation Office, Boise , ID

Public Utilities Commission, Boise, ID

Department of Water Resources, Division of Planning and Policy, Boise, ID

STATE OF MONTANA

IGR Clearinghouse, Office of Budget and Program Planning, Helena, MT

Office of Historic Preservation, Helena, MT

STATE OF NEVADA

Division of Historic Preservation and Archeology, Carson City, NV

State of Nevada Clearinghouse, Department of Administration, Carson City, NV

STATE OF NEW MEXICO

Department of Environment, Santa Fe, NM

Division of Historic Preservation, Office of Cultural Affairs, Santa Fe, NM

STATE OF OREGON

Department of Parks and Recreation, Salem, OR

Department of State Parks and Recreation, Salem, OR

STATE OF UTAH

Utah Clearinghouse, Office of Planning and Budget, Salt Lake City, UT

Utah Historical Society, Salt Lake City, UT

STATE OF WASHINGTON

Office of Archaeology and Historic Preservation, Olympia, WA

Department of Ecology Section of Environmental Review, Olympia, WA

STATE OF WYOMING

Office of Planning Coordinators, Cheyenne, WY

Public Service Commission, Cheyenne, WY

Department of Commerce, Division of Parks and Cultural Resources, Cheyenne, WY

TRIBES

Columbia River Intertribal Fish Commission, Portland, OR

Colville Confederated Tribes, Nespelem, WA

Confederated Tribes of Salish and Kootenai, Pablo MT

Kootenai Tribe of Idaho, Bonners Ferry, ID

Nez Perce Tribal Executive Committee, Lapwai, ID

Spokane Tribal Business Council, Wellpinit, WA

INDIVIDUALS

Kurt J. Breithaupt

Dwight Hausen

Derek Haros

Cindy Steagall

Wayne Sugai

BUSINESSES

American Rivers, Seattle, WA

Bechtel Civil and Minerals, Inc, San Francisco, CA

Clearing Up News, Seattle, WA

Dames & Moore, Boise, ID

G H Bowers Engineering, Seattle, WA

Gary Danielson & Associates, Inc., Jamestown, CA

James A. Sewell & Associates, Newport, WA

Kelleys Flooring Inc., Pryor, MT

Kit Manufacturing Company, Caldwell, ID

Landau Associated, Inc., Edmonds, WA

Stoel Rives Boley Jones & Grey, Portland, OR

Winston & Strawn, Washington, DC

INTEREST GROUPS

Idaho Conservation League, Boise, ID

Idaho Rivers United, Boise, ID

Idaho Steelhead and Salmon Unlimited, Boise, ID

Idaho Wildlife Federation, Boise, ID

Oregon Natural Desert Association, Bend, OR

Oregon Natural Resources Council, Portland, OR

Oregon Wildlife Federation, Portland, OR

Sierra Club, Seattle, WA

Sierra Energy and Risk Assessment, Roseville, CA

Trout Unlimited, Olympia, WA

Washington Trollers Association, Bellevue, WA

UTILITIES/UTILITY ASSOCIATIONS

BC Hydro Power Authority, Resource Management, Vancouver BC

Northwest Power Planning Council, Cheney, WA

Northwest Power Planning Council, Portland, OR

Pacific Power & Light, Portland, OR

Portland, General Electric, Portland, OR

Public Power Council, Portland, OR

Rocky Mountain Generation, Fort Collins, CO

TransAlta Utilities Corporation, Calgary, CANADA

Washington Water Power Company, Spokane, WA

DEPOSITORY LIBRARIES/LIBRARIES

Bellevue Public Library, Bellevue, WA

Blue Mountain Community College, Library, Pendleton, OR

Boise State University, Government Documents Library, Boise, ID

Central Oregon Community College, Government Documents Library, Bend, OR

Central Washington University, Library Documents Department, Ellensburg, WA

City of Boise, Public Library, Boise, ID

College of Carroll, Corette Library, Helena, MT

College of Idaho, Teterling Library, Caldwell, ID

College of Montana, Mineral Science and Technology Library, Butte, MT

College of Northern Montana, Vande Bogart Library, Havre, MT

College of Southern Idaho, Library, Twin Falls, ID

Eastern Oregon State College, Walter M. Pierce Library, La Grande, OR

Eastern Washington University, JFK Library, Documents Department, Cheney, WA

Everett Public Library, Everett, WA

Evergreen State College, Daniel J. Evans Library Documents Department, Olympia, WA

Fort Vancouver Regional Library, Librarian, Vancouver, WA

Gonzaga Univeristy, School of Law Library, Spokane, WA

Highline Community College, Library, Des Moines, WA

Lewis & Clark College, Aubrey R. Watzek Library, Portland, OR

Linfield College, Northup Library, McMinnville, OR

Montana State University, Department of Government Information, Library, Bozeman, MT

Multnomah County Library, Department of Science and Business, Portland, OR

North Olympic Library System, Port Angeles Branch, Documents Division, Port Angeles, WA

Northwest Nazarene College, John E. Riley Library, Nampa, ID

Northwestern School of Law, Paul L. Boley Law Library, Portland, OR

Oregon Institute of Technology Library, Klamath Falls, OR

Portland State University, Millar Library, Portland, OR

Reed College Library, Portland, OR

Ricks College, David O. McKay Library, Documents Department, Rexburg, ID

Seattle Public Library, Government Publications, Seattle, WA

Southern Oregon State College, Library Department of Documents, Ashland, OR

Spokane Public Library, Documents Department, Spokane, WA

State of Arizona Library, Department of Archives and Public Records, Phoenix, AZ

State of California Library, Government Publications Section, Sacramento, CA

State of Idaho Law Library, Boise, ID

State of Montana, Law Library, Helena, MT

State of Oregon Library, Salem, OR

State of Oregon, Supreme Court Law Library, Salem, OR

State of Washington, Law Library, Olympia, WA

State of Washington Library, Documents Section, Olympia, WA

State of Wyoming Library, Government Publications, Cheyenne, WY

Tacoma Public Llibrary, Documents Division, Tacoma, WA

Univeristy of Idaho, College of Law Library, Moscow, ID

University of Idaho, Documents Section, Library, Moscow, ID

University of Idaho, Eli Oboler Library, Pocatello, ID

University of Montana, Library, Documents Section, Missoula, MT

University of Nevada, Government Publications Department, Reno, NV

University of New Mexico, Government Publications Department, Albuquerque, NM

University of Oregon, Law Library, Eugene, OR

University of the Pacific, Harvey W. Scott Memorial Library, Forest Grove, OR

University of Puget Sound, School of Law Library, Tacoma, WA

University of Washington, Marian Gould Gallagher Law Library, Seattle, WA

U.S. Court of Appeals, 9th Circuit Court Library, Seattle, WA

Utah State University, Merrill Library, Documents Department, Logan, UT

Wabash College, Lilly Library, Crawfordsville, ID

Washington State University, Holland Library Documents Section, Pullman, WA

Western Oregon State College, Library Document Department, Monmouth, OR

Western Washington University, Mable Zoe Wilson Library, Bellingham, WA

Whitman College, Penrose Memorial Library, Walla Walla, WA

Willamette University, Main and Law Libraries, Salem, OR

    

Chapter 7: Environmental Consultation, Consultation, Review, and Permit Requirements

7.1 National Environmental Policy

This environmental impact statement (EIS) was prepared pursuant to regulations implementing the National Environmental Policy Act (42 USC 4321 et seq.), which requires Federal agencies to assess the impacts that their actions may have on the environment. Decisions will be based on understanding of the environmental consequences and actions will be taken to protect, restore, and enhance the environment.

7.2 Endangered and Threatened Species and Critical Habitat

The Endangered Species Act of 1973, as amended (16 USC 1536), requires Federal agencies to ensure that their actions do not jeopardize endangered or threatened species or their critical habitats. In compliance with Section 7, BPA requested from the U.S. Fish and Wildlife Service (USFWS) a list of endangered and threatened plant and animal species in the affected environment. This information was provided by the appropriate USFWS Field Offices in Idaho, Montana, Wyoming, Nevada, Oregon, and Washington, and is presented in Appendix B.

7.3 Fish and Wildlife Conservation

The Fish and Wildlife Conservation Act of 1980 (16 USC 2901 et seq.) encourages Federal agencies to conserve and to promote conservation of nongame fish and wildlife species and their habitats. The Fish and Wildlife Coordination Act (16 USC 661 et seq.) requires Federal agencies undertaking projects affecting water resources to consult with the U.S. Fish and Wildlife Service in order to conserve or improve wildlife resources.

The Pacific Northwest Electric Power Planning and Conservation Act (16 USC 839 et seq.) contains provisions intended to protect, mitigate, and enhance the fish and wildlife (including their spawning grounds and habitat) of the Columbia River and its tributaries. The Pacific Northwest Electric Power and Conservation Planning Council (Council) established under the Northwest Power Act developed a Regional Electric Power and Conservation Plan (Plan). In implementing its mandate to assure an adequate, efficient, economical, and reliable power supply, BPA must give due consideration to the protection, mitigation, and enhancement of the region's fish and wildlife resources.

7.4 Heritage Conservation

A number of Federal laws and regulations have been promulgated to protect the nation's historical, cultural, and prehistoric resources. BPA must consider whether its actions may have an effect on a property listed or eligible for listing on the National Register of Historic Places, a property listed on the National Registry of Natural Landmarks, a property listed as a National Historic Landmark, a property listed on the World Heritage List, a property listed on a state-wide or local list, or on the ceremonial rites or access to religious sites of Native Americans.

BPA has recently executed a Programmatic Agreement with the Bureau of Reclamation; Corps of Engineers; U.S. Forest Service; the Advisory Council on Historic Preservation; the Idaho, Montana, and Washington State Historic Preservation Officers; the Colville Confederated Tribes; and the Spokane Tribe of Indians. This Programmatic Agreement effectively mitigates for impacts to cultural resources from changes in elevation at these reservoirs, satisfying BPA's responsibilities under Section 106 of the National Historic Preservation Act. The Programmatic Agreement also ensures BPA's consistency with the American Indian Religious Freedom Act and the Native American Graves Protection and Repatriation Act by providing for BPA participation in the disposition of Native American burials if such sites are discovered.

7.5 State, Area-wide, and Local Plan and Program Consistency

In accordance with Executive Order 12372, this EIS will be circulated to the appropriate State clearinghouses to satisfy review and consultation requirements.

7.6 Coastal Zone Management Consistency

The Coastal Zone Management Act of 1972 requires that Federal actions be consistent, to the maximum extent practicable, with approved State Coastal Zone Management Programs.

7.7 Floodplains Management

Executive Order 11988 (Floodplain Management) and Department of Energy (DOE) regulations implementing the Executive Order (10 CFR Part 1022) direct BPA to avoid, to the extent possible, the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative.

7.8 Wetlands Protection

Executive Order 11990 (Protection of Wetlands) and Department of Energy regulations implementing the Executive Order (10 CFR Part 1022) direct BPA to minimize the destruction, loss, or degradation of wetlands; and to preserve and enhance the natural and beneficial values of wetlands.

7.9 Farmland Protection

The Farmland Protection Policy Act (7 USC 4201 et seq.) requires Federal agencies to identify and take into account the adverse effects of their programs on the preservation of farmlands.

7.10 Recreation Resources

7.11 Global Warming

A discussion of possible global warming effects has been included in this EIS. Greenhouse gases have been included in this analysis by volume of emissions only; dollar values have not been assigned.

7.12 Permits for Structures in Navigable Waters

If a proposed action includes a structure or work in, under, or over a navigable water of the United States; a structure or work affecting a navigable water of the United States; or the deposit of fill material or an excavation that in any manner alters or modifies the course, location, or capacity of any navigable water of the United States, a Section 10 Permit under the Rivers and Harbors Appropriations Act of 1899 will be required from the U.S. Army Corps of Engineers. The proposed and alternative actions anayzed in this EIS do not encompass any activity known to require a Section 10 Permit.

7.13 Permits for Discharges Into Waters of the United States

A Section 404 Permit (Permit for Discharges into the Waters of the United States) under the Federal Water Pollution Control Act (Clean Water Act) of 1972 as amended will not be required from the U.S. Army Corps of Engineers because the proposed alternative actions analyzed in this EIS do not include the discharge of dredged or fill material into waters of the United States.

7.14 Permits for Rights-of-Way on Public Land

If an action involves the use of public or Indian lands not in accordance with the primary objective of the management of those lands, under the Federal Land Policy and Management Act (43 USC 1701 et seq.), a permit for a right-of-way across such lands will be required. However, the proposed or alternative actions analyzed in this EIS do not involve the use of public or Indian lands.

7.15 Energy Conservation at Federal Facilities

7.16 Pollution Control at Federal Facilities

In addition to their responsibilities under NEPA, Federal agencies are required to carry out the provisions of other Federal environmental laws. The Federal actions related to the alternatives discussed in this EIS do not require any particular response with regard to these other Federal laws, which are more concerned with site-specific proposals and alternatives, rather than the broad capacity marketing decisions being analyzed in this document.

7.17 Other

u Title 16 U.S.C. 1131, et seq., The Wilderness Act, as amended; Title 43 CFR Part 19, "Wilderness Preservation"

To the extent applicable to a specific alternative presented in this EIS, compliance with the standards contained in the following legislation is mandatory:

u Title 42 U.S.C. 7401, et seq., The Clean Air Act, as amended

u Title 33 U.S.C. 1251 et seq., The Clean Water Act, as amended

u Title 42, U.S.C. 300 F, et seq., The Safe Drinking Water Act, as amended

u Title 10 CFR Part 712, "Grand Junction Remedial Action Criteria"

u Title 40 CFR Part 190, "Environmental Radiation Protection Standards for Nuclear Power Operations"

u Title 40 CFR Part 191, "Environmental Radiation Protection Standards for Management and Disposal of Spent Nuclear Fuel, High-Level, and Transuranic Radioactive Wastes"

u Title 40 CFR Part 192, "Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings"

u Title 42 U.S.C. 9601 [9615] et seq., The Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended

u Title 7 U.S.C. 136, et seq., The Federal Insecticide, Fungicide, and Rodenticide Act, as amended

u Title 42 U.S.C. 6901, et seq., The Resource Conservation and Recovery Act of 1976, as amended

u Title 15 U.S.C., et seq., The Toxic Substances Control Act, as amended; Title 40 CFR Part 761, "Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions"

u Title 42, U.S.C. 4901, et seq., The Noise Control Act of 1972, as amended

Chapter 8: Glosssary

Glossary of Terms

The words below are defined for the reader as they are used in this EIS.

A list of acronyms and abbreviations begins on page 7-9.

aMW

- (see Average megawatts)

Acquisition -

The gain of a power resource, including demand-side and supply-side categories, in the form of energy or capacity. The term is commonly used by BPA to distinguish acquisition from ownership of a project and its facilities, from which BPA is prohibited by law.

Agreement -

The proposed new Surplus Firm Capacity Sale Agreement (see Appendix A) between the Bonneville Power Administration and PacifiCorp.

Air basins

- Defined areas which generally confine the air-borne pollutants produced within them. Air pollutants tend to circulate and mix together within a basin.

Ambient air -

The air surrounding a particular spot, such as a power plant.

Annual average megawatts

- A unit of energy output over a year equivalent to the energy produced by the continuous operation of 1 megawatt of capacity over a period of 1 year (equivalent to 8,760,000 kilowatthours).

Availability factor

- Ratio of the amount of time a resource is capable of providing service to the amount of time the resource is actually in service over a given period.

Average megawatts (aMW)

- The average amount of energy (number of megawatts) supplied or demanded over a specified period of time.

Baseload

- In a demand sense, a load that varies only slightly in level over a specified time period. In a supply sense, a plant that operates most efficiently at a relatively constant level of generation.

cfs

- (see Cubic feet per second)

Calendar week

- The week beginning at 0001 on Sunday, and ending at 2400 hours on the following Saturday.

Capacity

- The amount of power that can be produced by a generator or carried by a transmission facility at any instant. Also, the service whereby one utility delivers firm peaking energy during another utility's period of peak usage with return made during the second utility's offpeak periods; compensation for this service may be with money, energy, or other services.

Capacity/energy exchange

- A transaction in which one utility provides another with capacity service in exchange for additional amounts of firm energy (exchange energy) usually during off-peak hours or money under specified conditions.

Capital costs

- The costs to construct a power plant, including the costs of materials, permits, and interest on borrowing.

Contract demand

- The maximum rate of delivery in any hour, in megawatts, for surplus firm capacity.

Contract year -

The period September 1, 1994 , through June 30, 1995, and thereafter each 12 months beginning July 1, or such other 12-month period as may be adopted as a contract year under the Pacific Northwest Coordination Agreement, as it may be amended or replaced.

Cost-effective

- An acceptable level of cost for a measure or a resource that meets or reduces electrical power demand by consumers. A resource or measure is cost-effective if its estimated incremental system cost is no greater than that of the least-cost similarly reliable and available alternative or combination of alternatives.

Critical period

- The portion of the historical stream flow of record for the Columbia River system during which the least amount of electrical energy can be generated by drafting the reservoirs according to seasonal power demands. Critical period is a fundamental planning concept used to determine annual firm energy load carrying capability for the hydro system.

Critical period average energy generation

- The average amount of energy projected to be generated during a period (which can vary in length depending on the purpose of the planning) of extremely low streamflow. Used as a basis for resource planning.

Cultural resources

- The nonrenewable evidence of human occupation or activity as seen in any district, site, building, structure, artifact, ruin, object, work of art, architecture, or natural feature that was important in human history at the national, state, or local level.

Demand

- The level of electric energy, in kilowatts or megawatts, that is needed at any given time.

Demand-side management

- Strategies for reducing, redistributing, shifting, or shaping electrical loads, with an emphasis toward reducing or leveling load peaks. These strategies can be accomplished by influencing when and how customers use electricity. Examples include conservation measures, rate incentives for shifting peak loads, and energy storage schemes.

Dispatch

- The monitoring and regulation of an electrical system to provide coordination; or the sequence by which electrical generating resources are called upon to generate power to serve changing amounts of load.

Displacement

- The substitution of less-expensive energy (usually hydroelectric energy transmitted from the Pacific Northwest or Canada) for more expensive thermal energy produced in California. Such displacement means that the thermal plants may reduce or shut down their production, saving money and often reducing air pollution as well.

Endangered

- A plant or animal species that is in danger of extinction throughout all or a significant portion of its range because its habitat is threatened with destruction, drastic modification, or severe curtailment, or because of overexploitation, disease, predation, or other factors; federally endangered species are officially designated by the U.S. Fish and Wildlife Service and published in the Federal Register.

Energy

- The ability to produce electrical power over a period of time--expressed in kilowatthours.

Energy conservation

- Any reduction in electric power consumption, from what it would otherwise have been, as a result of increases in the efficiency of energy use, production, or distribution.

Energy surplus

- A condition in which a utility system can supply more energy than is demanded; the energy may be nonfirm, due to water conditions, or firm, due to excess generating capability.

Exchange energy

- Under a capacity/energy exchange contract, the energy that must be generated or purchased by a utility as compensation for capacity service that was provided by another utility.

Export sales

- The sales of electricity from one region to another.

Extraregional

- Any entity or place not within the Pacific Northwest.

FCRPS

- (see Federal Columbia River Power System)

FEIS -

Final Environmental Impact Statement

Federal Columbia River Power System (FCRPS)

- The hydroelectric dams on the Columbia River financed by the U.S. Treasury, which operate as a coordinated generation system, and for which BPA serves as the power marketer.

Firm

- In the power industry, guaranteed or assured. May refer to a guaranteed supply of power, to guaranteed access to a means to transmit power, or, with reference to loads, to guaranteed service for a defined need. Usually defined for a given period of time.

Fossil fuel

- A combustible, carbonaceous material formed from the remains of ancient plants and animals. Common fossil fuels include coal, natural gas, and derivatives of petroleum such as fuel oil and gasoline.

Heavy load hours (HLH)

- The period from 0700 hours through 2200 hours on any day Monday through Saturday.

Hydroelectric

- With reference to a power system, the production of electric power through use of the gravitational force of falling water.

ISW -

(See Inland Southwest)

Inland Southwest -

For this EIS, the States of Nevada, Arizona, Utah, and New Mexico.

Intertie

- A transmission line or system of lines permitting a flow of energy between major power systems. BPA has several interties, both AC and DC, connecting the Pacific Northwest to the Southwest, Canada, and Montana.

Investor-owned utility (IOU)

- A privately owned utility whose programs are financed by private (nongovernment) investors in the utility's stocks and bonds. (In contrast to publicly owned utilities.)

Kilowatthour (kWh)

- The common unit of electric energy equal to 1 kilowatt of power supplied to or taken from an electric circuit for 1 hour. A kilowatt equals 1,000 watts.

Light load hours (LLH)

- Those hours that are not heavy load hours.

Load

- The amount of electric power or energy delivered or required at any specified point or points on a system. Load originates primarily at the energy-consuming equipment of the customers.

Load growth

- Increase in demand for electricity.

Load management

- Methods or programs used by utilities or building and facility managers to reduce, reshape, or redistribute electrical loads.

Load/resource balance

- The point at which the demand for electricity matches or balances the amount and type of resources available to serve that demand.

Load shape

- The profile of a building or facility's kilowatt demand over time, usually over the hours of the day, which can be derived from metered data. Typically, utility system load shapes peak during the day and are reduced at night. Different types of businesses, industrial operations, and residential users show markedly different load shapes.

Long-Term Intertie Access Policy (LTIAP)

- The policy developed by BPA to allocate use of the Federal portion of the Intertie for the long term, an indefinite period that would at least encompass long-term power sales (up to 20 years) and long-term transmission contracts.

Low water years

- Years in which less water than usual is received in a river system producing power from water flow. This is usually a consequence of reduced rain/snowfall over the fall and winter months.

MW

- (see Megawatt)

Megawatt (MW)

- A megawatt is 1 million watts, an electrical unit of power.

Near term

- In general, the immediate future--a period of time usually less than 3 years.

Nonfirm energy sales

- Sales of electricity that are not guaranteed, but are interruptible under specified conditions.

Nonfirm energy

- Energy produced by the hydropower system that is available when water conditions are better than critical period water flows and after reservoir refill is assured. Nonfirm energy is available in varying amounts depending upon season and weather conditions. Nonfirm energy is made available or supplied by BPA to a purchaser under an

arrangement that does not have the guaranteed continuous availability of firm power. (See "Critical Period.")

Off-peak hours

- Period of relatively low system demand for electrical energy, as specified by the supplier (such as the middle of the night).

Operating year

- The 12-month period from September 1 through August 31.

PF rate

- (see Priority Firm rate)

PNW

- (see Pacific Northwest)

Pacific Northwest (PNW)

- According to the 1980 Northwest Power Act, the Pacific Northwest comprises Oregon, Washington, Idaho, and Montana west of the Continental Divide, as well as portions of Nevada, Utah, and Wyoming that are within the Columbia-Snake River Basin. The Pacific Northwest also includes any contiguous areas not more than 75 miles from the region defined above that are part of the service area of rural electric cooperative customers served by BPA on the effective date of the Act whose distribution system serves both within and without the region.

Pacific Northwest Coordination Agreement (PNCA)

- An agreement between Federal and non-Federal owners of hydropower generation on the Columbia River system. This agreement governs the seasonal release of stored water to obtain the maximum usable energy, subject to other uses.

Pacific Northwest Electric Power Planning and Conservation Act

- In December, 1980, Congress passed this Act, Public Law 96-501 (referred to as the Northwest Power Act). This Act authorized the four Pacific Northwest States--Idaho, Montana, Oregon, and Washington--to enter into an interstate compact for the purpose of long-range planning and protection of shared resources. As a result of the Act, each of the four States passed enabling legislation to create the Pacific Northwest Electric Power Planning and Conservation Council in April 1981.

Pacific Northwest Electric Power Planning and Conservation Council (Council)

- A council established by the Pacific Northwest Electric Power Planning and Conservation Act in 1981 made up of two voting representatives from each Northwest State--Washington, Oregon, Idaho, and Montana. The Council is charged with planning for power resources and enhancement of fish and wildlife resources in the region.

Pacific Northwest Power Act

- (see Pacific Northwest Electric Power Planning and Conservation Act)

Pacific Northwest Utilities Conference Committee (PNUCC)

- A voluntary association of consumer and investor-owned utilities and BPA's direct service industries in the Pacific Northwest. Its primary role is to represent its members and their interests in pending legislation and regulating the formation of power planning policy.

Pacific Southwest -

For this EIS, the States of California, Nevada, Arizona, Utah, and New Mexico.

Peak energy

- The amount of energy (in megawatthours) used during a peak load period.

Peak loads

- The maximum electrical demand for power in a stated period of time. It may be the maximum instantaneous load or the maximum average load within a designated interval of the stated period of time.

Peaking energy

- The electric energy associated with the delivery of surplus firm capacity.

Peaking replacement energy

- An amount of energy equal to the peaking energy which is obligated to be returned to Bonneville.

Point(s) of delivery (POD)

- The point(s) of interconnection between Bonneville's and a customer utility's systems.

Power Plan

- A 20-year power plan developed by the Pacific Northwest Electric Power Planning and Conservation Council. In the Plan, the Council proposed a comprehensive set of actions and projects to be undertaken to assure the region of adequate power resources, giving due consideration to conservation and fish and wildlife needs.

Preference customers

- One of the regional publicly owned or cooperative utilities, who sell retail electricity, and Federal agency end-users to whom BPA markets power. Preference status is accorded by prior Congressional act.

Priority Firm (PF) rate

- The priority firm (PF) rate schedule is for sale of firm power to be used within the Pacific Northwest by public bodies, cooperatives, Federal agencies, and IOUs participating in the residential and small farm exchange under Section 5(c) of the Northwest Power Act.

Regional

- Referring to the characteristics of an area, as opposed to those of a surrounding or adjacent area. Generally used in this EIS to distinguish between the Pacific Northwest and Canada or California or the Inland Southwest. (see Extraregional)

Renewable resource

- A resource that uses solar, wind, water (hydro), geothermal, biomass, or similar sources of energy, and is used either for electric power generation or for reducing the electric power requirements of a customer.

Reserve margins

- For a power plant or transmission facility, extra capacity above the amount projected to be needed, to allow for

unanticipated demand for power, equipment failure, or other unforeseen events.

Resource mix

- The different types of resources used to generate power (e.g., hydroelectric, thermal, etc.) within a given area or for a given utility.

Resource schedule

- The planned schedule of when and what resources will be available in the future to serve load in a given area or of a given utility.

Resource supply curves

- A traditional economic tool used to depict or forecast the amount of a product available across a range of prices.

Return energy

- The energy that is returned to BPA, equalling the amount of energy previously delivered, under the terms of BPA's capacity sales.

Scoping

- The definition of the range of issues requiring examination in studying the environmental effects of a proposed action. Scoping generally takes place through public consultation with interested individuals and groups, as well as with agencies with jurisdictions over parts of the project area or resources in that area. Scoping is mandated by the Council on Environmental Quality regulations.

Secondary power

- The excess above firm power to be furnished to a customer when, as, and if available.

Secondary sales

- Surplus power, both firm and nonfirm, in the Pacific Northwest that is available for sale.

Sector

- A large group of energy users with similar types of conservation or generation opportunities. Sectors include residential, commercial, industrial, and agricultural.

Shaping

- The scheduling and operation of generating resources to meet load of changing levels. Load shaping on a hydro system usually involves the adjustment of storage releases so that generation and load are continuously in balance.

Short-term sales

- Sales made for a relatively short period of time.

Spot market

- A market for electricity characterized by negotiation, almost solely on the basis of price, for relatively short-term sales.

Storage reservoirs

- Reservoirs maintained behind dams for the purpose of retaining excess water readily available during springtime flows as snow melts. Retained water is then released, as necessary, during periods of lower flow in order to maintain necessary levels of power production. (Water may also be released for other purposes, such as navigation, irrigation, and maintenance of life support for fish.)

Surplus capacity

- Amount of electrical capacity above the amount needed to meet the current load requirements of BPA customers.

Surplus energy

- Generally energy generated that is beyond the immediate needs of the producing system. Specifically for BPA, firm or nonfirm electric energy generated at Federal hydroelectric projects which would otherwise be wasted if there was not a market for the energy.

Surplus firm energy

- Energy that can be generated and guaranteed to be provided, but is excess to demand.

Surplus firm power

- Power that can be provided on a guaranteed basis, that is excess to system demand, and that can be provided in an agreed upon shape.

Surplus nonfirm energy

- An excess of interruptible energy that is available due to water conditions better than critical.

Surplus peaking capacity

- Electric peaking capacity for which there is no demand in the Pacific Northwest at the rate established for the disposition of such capacity.

System Operation Review (SOR)

- A public involvement process conducted by three Federal agencies--BPA, the Bureau of Reclamation, and the Corps of Engineers--who are concerned with the operation and use of the Federal Columbia River Power System (FCRPS). Key events affecting the outcome of the SOR are the pending expiration in 2003 of the Coordination Agreement among U.S. parties who operate the U.S. dams in the FCRPS, and the end of sale period of the Canadian Entitlement, which is part of the Columbia River Treaty that allocated Canada's firm power benefits from the Treaty to the U.S.

Thermal resources

- Generating plants which convert heat energy into electric energy. Coal, oil, and gas-fired power plants and nuclear power plants are common thermal resources.

Workday

- For power scheduling purposes, each day that both Bonneville and a customer utility observe as a regular day of work.

ACRONYMS and ABBREVIATIONS

aMW	Average megawatts
BPA	Bonneville Power Administration

C	Celsius
CCCT	Combined cycle combustion turbine
CEC	California Energy Commission
CT	Combustion turbine
DOE	Department of Energy
DSI	Direct Service Industry
EPA	Environmental Protection Agency
FCRPS	Federal Columbia River Power System
FERC	Federal Energy Regulatory Commission
FY	Fiscal year
HLH	Heavy load hours
IOU	Investor-owned utilities
ISW	Inland Southwest
kWh	Kilowatthour
LLH	Light load hours
MMBtu	Million British thermal units
MW	Megawatt
MWh	Megawatt-hour
NEPA	National Environmental Policy Act
Northwest Power Act	Pacific Northwest Electric Power Planning and
	Conservation Act
O&M	Operating and maintenance
ODEQ	Oregon Department of Environmental Quality
OY	Operating year
PF	Priority Firm
PNCA	Pacific Northwest Coordination Agreement
PNUCC	Pacific Northwest Utilities Conference Committee
PNW	Pacific Northwest
POD	Point of Delivery
PP&L	Pacific Power and Light Company
PSW	Pacific Southwest
Project Act	Bonneville Project Act of 1937
SCT	Simple Cycle Turbine
SOR	System Operation Review
SOS	System Operating Strategy
TSP	Total suspended particulates





Chapter 9: References

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Appendix C: Air Quality

Combustion Turbines

Technical Description

Combustion turbines (or CTs, also called gas turbines) are the same technology used in jet engines. In the basic CT design, air enters a compressor, which packs large amounts of air into a combustor at high pressure. In the combustor, fuel is added to the air and burned, releasing heat energy and producing a high-temperature, high-pressure exhaust gas. This gas is expanded through a turbine, which powers a generator and the compressor.

Natural gas or distillate oils are the primary fuels used in combustion turbines. Gasified fuels, such as the syngas derived from coal, are also potential fuel candidates. The heat rate (or efficiency) for gas turbines is about the same as steam turbine generators. However, CT thermal efficiency is improving as the technology improves and CTs gain the flexibility of conversion to combined-cycle operation.

The inefficiency of a combustion turbine can be seen in the high temperatures of the gases discharged from the turbine. There is significant available energy in the exhaust gases, which can be recovered through a heat recovery process. One way to take advantage of this available energy is to use steam injection (which also has the benefit of reducing NOx emissions). In a steam-injected turbine, hot exhaust gases are recirculated to heat pressurized water into superheated steam. The steam is then injected into the combustor of the turbine and mixes with compressed inlet air. The additional inlet steam helps drive the turbine.

CT efficiencies can also be improved by using multi-stage compressors with inter-cooling between stages and by operation at higher turbine inlet temperatures. Currently, turbines achieve temperatures around 1111 degrees Celcius (ºC) (2000 degrees Fahrenheit (ºF)) , but improvement in heat-tolerant materials can increase this limit to more than 1278º C (2300ºF).

The high thermal energy in the turbine exhaust makes CTs ideal in cogeneration applications where high-grade process heat is used in addition to electricity. Another way to take advantage of the energy in the exhaust gases is to use the combustion turbine as the "topping cycle" in a combined cycle plant.

Combustion turbine technology is proven and widely used. Simple-cycle CT (SCT) designs are basic, reliable, and relatively easy to site. They can be installed with minimum site renovation and preparation because they are compact and generally do not require additional equipment, such as cooling towers or elaborate fuel processing subsystems.

A combined cycle combustion turbine (CCCT) combines a combustion turbine with a steam cycle plant to generate power very efficiently. Electricity is first generated from the combustion turbine. The exhaust gases from the CT then become the heat source for raising water to steam in a steam cycle system. The combustion turbine cycle is referred to as the "topping cycle," and the steam turbine cycle as the "bottoming cycle."

Combined cycle plants are designed to maximize the thermal efficiency of a power plant by using the available energy in the combustion turbine's high-temperature exhaust gases. The key to the combined cycle is the heat recovery steam generator system, which takes the place of the steam cycle boiler. Typical steam conditions in a heat recovery steam generator are 500 to 556ºC (900 to 1000ºF) and 70,307 to 105,461 grams per square centimeter (1000 to 1500 pounds per square inch). Instead of rejecting heat to the environment at gas turbine temperatures of more than 555ºC (1000ºF), the combined cycle eliminates heat at the steam cycle condenser temperature, which is the temperature of available cooling water--approximately 28 to 39ºC (50 to 70ºF).

Operating Characteristics and Capacity Contribution

Combustion turbines can be operated to meet both peak and energy loads. CTs can quickly respond to load demand

changes; however, maximum efficiencies are obtained when operating at design capabilities. Because of high fuel costs, CTs tend to be used at a constant rate for a limited period of time. CTs can be quickly fired up and have proved effective in meeting short-term peak loads and load fluctuations due to extreme weather conditions.

CT availability factors run 80 to 90 percent. Simple CTs operate at heat rates of 11,000 to 12,000 Btu/kWh. Combined cycle applications operate at heat rates of 7500 to 8500 Btu/kWh.

Combustion turbines offer very good dispatchability, which provides many options in how CTs may be operated. These options include: (1) baseload-type operations where the plant is running most of the year; (2) daily peaking, where the plant is ramped up during the day to meet peak loads, but ramped down at night, thereby reducing problems of returning energy to the Northwest hydro system; or (3) seasonal or short-term peaking, where the plant is running for a period of prolonged heavy loads (e.g., during a cold snap) or during periods of low streamflow. Each of these options would result in different amounts of energy and capacity being provided. Under baseload-type conditions, the annual energy would be produced; however, under the other options, the resulting energy would be less than the annual amount. Capacity would be provided under any of the options, but ability to react to daily or weekly load fluctuations may be greater under the second option. If it is economic and if nonfirm energy is available, CTs could be displaced under any of these options.

If operated for capacity, a combustion turbine would meet peak loads but provide less total energy throughout the year. For example, at an expected capacity factor of 50 percent, a CT could provide extra capacity in several modes. One mode would be to operate it at 50 percent per day, running at maximum during the day and much lower at night. Another mode would be to use a CT to recharge the hydro system when it is drawn down to meet prolonged heavy loads (e.g., during a cold snap). The CT would be kept idle perhaps half of the weeks of the winter, but turned on for maximum, flat operation during cold weather, allowing the reservoirs to refill and increase their capacity effectiveness by increasing the head at each reservoir.

Costs

Cost estimates shown in Table C-1 are based on documentation contained in a July 1988 report, *Development of Combustion Turbine Capital and Operation Cost,* prepared for BPA by Fluor Daniel, Inc. The cost of power resulting from using nonfirm energy with CTs is dependent on the amount of nonfirm energy available, the value of nonfirm energy, and the cost and availability of fuel to operate such CTs.

Table C-1:

Costs - Combustion Turbines (1988$)

(**Source:** *Resource Programs Final Environmental Impact Statement*, Bonneville Power Administration, April 1993)

Capital Cost ($/kW)	
Simple Cycle	660**a**
Combined Cycle	747**a**
O&M Cost	
Fixed ($/kW-yr)	
Simple Cycle	3.06
Combined Cycle	7.51
Variable (mills/kWh)	
Simple Cycle	b
Combined Cycle	b

Real Levelized Costs (mills/kWh)	c
Nominal Levelized Costs (mills/kWh)	c

a These capital cost estimates include a $120/kW transmission adder, which

reflects siting on the east side of the Cascades.

b The variable costs have been loaded into the fixed costs.

c Combustion turbine cost depends on how they are used. When displaced by

nonfirm hydro power, combined cycle CTs have a cost of 26 to 34 mills/kWh (real).

Environmental Effects and Mitigation

The primary environmental effects of CTs are shown in Figure C-1. CTs that use natural gas are relatively clean burning. Only NOx emissions tend to be a problem because of the high combustion temperatures, but significantly less so than in coal combustion. NOx can be controlled with either water or steam injection into the CT combustor, eliminating up to 80 percent of the NOx. Water use and visible steam plumes in this case become an environmental concern, but water use can be minimized by re-using the condensed exhaust steam for steam injection.

Figure C-1: Environmental Effects and Mitigation - Combustion Turbines *(This figure not available in electronic format)*

If oil fuels are used, there is some sulfur dioxide pollution. SOx exhaust gas can be mitigated with scrubbers, which add to the cost of CTs. As in all combustion technologies, significant amounts of CO2, a "greenhouse" gas, and waste heat are produced. Simple-cycle CTs reject waste heat directly to the atmosphere, so cooling water is not required.

Because CTs are often sited close to where gas transportation and transmission lines meet, effects on urban environments need to be considered. CT noise can be a problem. Noise levels of unsilenced CTs can run 65 to 70 decibels at 366 meters (1200 feet) from an operating turbine. Silencing packages can reduce this to 51 decibels at 122 meters (400 feet).

Environmental impacts for combined cycle plants are the combined impacts of waste heat boiler plants and combustion turbines. For the amount of fuel combusted, though, plant efficiencies are proportionately higher, and, therefore, the environmental impacts are proportionately less.

Examples of potential environmental impacts for the gas-fired combustion turbine fuel cycle are shown in

Table C-2: Potential Annual Environmental Impacts Per Average Megawatt Per Year of Energy Generation for the Natural Gas-Fired Combined Cycle Combustion Turbine Fuel Cycle

(This table is reproduced from the *Resource Programs Final Environmental Impact*

Statement, Bonneville Power Administration, April 1993)

Potential Impacts	On-Shore Gas Extraction	Transportation	Generation
Air Pollutants Sulfur Oxides (tons) Oxides of Nitrogen (tons) Particulates (tons) Carbon Dioxide (tons) Carbon Monoxide	0.95 0.056 0.0013	0.0004 tons 0.266 tons	0.03**d** 5.81**d** 0.03**d** 3,904.95**d** 2.23**e**

Water Quality Impacts Consumption (acre-ft) Discharge Biological Oxygen Demand (tons) Chemical Oxygen Demand (tons) Oil and Grease (tons) Chromium (tons) Zinc (tons)	0.0058 acre-ft drilling mud 0.0011 0.0074 0.0228 0.00006 0.00002	•	3.4**f** 0.0081 0.651
Total Dissolved Solids (tons)	0.305	•	1.06
Total Suspended Solids (tons)	•	•	1.14
Ammonia (tons)	•	•	0.00012
Chloride (tons)	0.057	•	•
Sulfate (tons)	0.046	•	•
Thermal Discharge	•	•	28,800
Land Effectsb Acreage Requirements	.025 Permanent .032 Temporary	4.18	0.15 per MW capacity corrected for capacity
Waste Streams Solid Wastes (tons)	2.24 (Drill Cuttings)	•	undetermined
Employmentb Construction (employee-years)	.029	0.45	1.4 (per MW capacity)
Operations (employees per year)	.003	0.013 employees	0.1 (per MW capacity)
Occupational Safety and Healthc	•	•	•
O&M Injuries	7.7 x 10-8 to 2.174 x 10-6	1.06 x 10-7 to 1.7 x 10-7	3.4 x 10-6 to 6.34 x 10-5
O&M Deaths	9 x 10-10 to 2.23 x 10-8	3 x 10-10 to 3 x 10-9	2.5 x 10-8 to 1.1 x 10-6

Construction Injuries	•	•	6.8 x 10-6 to 9.88 x 10-5
Construction Deaths	•	•	2.23 x 10-8 to 4 x 10-7

a Unless otherwise indicated, these generic estimates are adapted from: U.S. DOE. 1983. *Energy Technology Characterizations*

Handbook, Environmental Pollution and Control Factors. DOE/EP-0093. Washington, DC.

b See sources and calculations in Appendix F to this EIS. Sixty-five percent capacity factor assumed.

c Adapted from Arthur D. Little. 1985. *Analysis of Routine Occupational Risks Associated with Selected Electrical Energy*

Systems. EA-4020. Electric Power Research Institute, Palo Alto, California.

d From BPA's emission estimates for environmental costs and planning.

e Adapted from Northwest Power Planning Council. 1991. *Northwest Conservation and Electric Power Plan,* Volume II-Part II.

f Flow rate requirements taken from Fluor Daniel, Inc. 1988. *Development of Combustion Turbine Capital and Operating Costs.*

DOE/BP-63056-1. Bonneville Power Administration, Portland, Oregon.

Supply Forecast

The quantity of combustion turbines installed is not inherently limited. Constraints that are typically discussed include ability to site and availability of fuel supply. These constraints will not impose an impediment for the first several hundred megawatts. For this EIS, 1680 MW of CCCT capacity (1394 aMW energy) is considered to be available to the region, of which 1260 MW capacity and 1046 aMW energy would be available to BPA. It is possible to initially install simple cycle CTs that are configured for conversion to combined cycle units.

Appendix D: Capacity Analysis

1993-94
OPERATING YEAR
RUN DATE: 03/05/93 MEDIUM LOAD FORECAST

PEAK IN MEGAWATTS	AUG	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	A
UNADJUSTED	1-15	16-31								1-15	16
1929 FED FIRM SURPLUS/DEFICIT	6224	3281	3448	3131	3392	4448	1896	1329	1865	1778	2
1930 FED FIRM SURPLUS/DEFICIT	3102	3136	2550	1799	2954	3476	1613	107	1517	2529	2
1931 FED FIRM SURPLUS/DEFICIT	5246	3951	2517	1943	2857	3984	1536	-162	840	4300	1
1932 FED FIRM SURPLUS/DEFICIT	2285	2906	2449	1444	1705	2956	4576	5271	5404	5062	3
1933 FED FIRM SURPLUS/DEFICIT	4762	5475	4071	3168	3129	4741	5834	5436	5648	5000	3
1934 FED FIRM SURPLUS/DEFICIT	7890	6979	3915	3523	6227	6320	5824	5475	5737	5329	3
1935 FED FIRM SURPLUS/DEFICIT	3686	3562	4107	2851	3005	4435	5786	6059	4314	4194	3
1936 FED FIRM SURPLUS/DEFICIT	6687	3344	4093	3294	3933	4804	5431	3814	5405	5347	3
1937 FED FIRM SURPLUS/DEFICIT	3394	3207	3600	3408	4051	4439	1387	2055	1784	2852	2
1938 FED FIRM SURPLUS/DEFICIT	2368	2573	2505	1504	520	3148	5817	5408	5768	5171	3
1939 FED FIRM SURPLUS/DEFICIT	2893	2790	4042	3471	3739	4286	4106	410	5986	6172	4
1940 FED FIRM SURPLUS/DEFICIT	4385	3368	3926	3595	4131	4515	4599	912	6165	6985	4
1941 FED FIRM SURPLUS/DEFICIT	4014	3361	2614	2063	3100	3970	2380	2456	1882	4983	3
1942 FED FIRM SURPLUS/DEFICIT	4933	4847	2493	1774	3322	6271	5818	6072	3982	5942	3
1943 FED FIRM SURPLUS/DEFICIT	5846	3913	4113	3442	3429	4522	5841	5487	5756	5339	3
1944 FED FIRM SURPLUS/DEFICIT	6190	3059	3689	3205	3846	4437	1556	841	634	3065	3
1945 FED FIRM SURPLUS/DEFICIT	2651	2487	2558	1556	1950	3174	2692	1182	2093	4011	2
1946 FED FIRM SURPLUS/DEFICIT	2383	2426	2562	1567	2081	2849	5860	5486	5785	5057	3
1947 FED FIRM SURPLUS/DEFICIT	6020	3711	4052	3327	3278	6239	5868	5518	5848	5275	3
1948 FED FIRM SURPLUS/DEFICIT	4683	2750	3831	5583	5027	6053	5861	5485	5690	5215	3
1949 FED FIRM SURPLUS/DEFICIT	7588	7040	4100	3223	3668	4726	5861	5683	6018	5611	3
1950 FED FIRM SURPLUS/DEFICIT	2385	2425	2549	1561	1735	4575	5861	5454	5692	5242	3
1951 FED FIRM SURPLUS/DEFICIT	7770	6307	3816	4289	5663	6369	5869	5489	5758	5301	3
1952 FED FIRM SURPLUS/DEFICIT	7852	4337	3418	5133	3339	5939	5856	5611	5938	5527	3
1953 FED FIRM SURPLUS/DEFICIT	5301	2425	3735	3242	4008	4715	5868	5538	4984	4739	3
1954 FED FIRM SURPLUS/DEFICIT	5705	4843	3742	3306	3229	4539	5865	5468	5673	5197	3

1955 FED FIRM SURPLUS/DEFICIT	7981	8429	6097	3215	3868	5561	5856	5890	5174	5796	2278
1956 FED FIRM SURPLUS/DEFICIT	6814	3040	3552	2125	4518	6368	5866	5482	5685	5197	3139
1957 FED FIRM SURPLUS/DEFICIT	6459	5161	2555	1891	2562	5961	5862	5643	5976	5564	3643
1958 FED FIRM SURPLUS/DEFICIT	2619	2426	3642	3271	3631	4361	5861	5650	6035	5341	3394
1959 FED FIRM SURPLUS/DEFICIT	2911	3068	3666	3114	3164	5613	5863	5474	5670	5227	3339
1960 FED FIRM SURPLUS/DEFICIT	6568	4947	7272	7414	6505	6212	5862	5558	5913	5547	3325
1961 FED FIRM SURPLUS/DEFICIT	5822	2475	3838	3580	2960	4497	5838	5463	5726	5307	3403
1962 FED FIRM SURPLUS/DEFICIT	2985	3950	3809	3237	3541	4105	5824	5861	6281	5991	3750
1963 FED FIRM SURPLUS/DEFICIT	5472	4180	3673	3499	2977	6151	5866	6041	5711	5928	2508
1964 FED FIRM SURPLUS/DEFICIT	5123	4008	4145	3181	3244	4381	5863	5521	5800	5348	2606
1965 FED FIRM SURPLUS/DEFICIT	6876	4694	3685	3609	3881	6369	5868	5537	5804	5326	3418
1966 FED FIRM SURPLUS/DEFICIT	7669	6925	3964	3391	3869	5165	5859	6123	6065	5919	3411
1967 FED FIRM SURPLUS/DEFICIT	5956	3135	3767	3140	3605	4122	5856	5465	5726	5254	2038
1968 FED FIRM SURPLUS/DEFICIT	7435	4823	3929	2736	3237	4821	5867	5745	6315	5009	2195
1969 FED FIRM SURPLUS/DEFICIT	3077	5321	5541	4934	5312	6110	5856	5426	5721	5319	3459
1970 FED FIRM SURPLUS/DEFICIT	3237	2413	2560	2617	3102	4182	5842	6303	6775	6151	2701
1971 FED FIRM SURPLUS/DEFICIT	2385	2426	2660	2321	3126	4451	5855	5366	5634	5025	3197
1972 FED FIRM SURPLUS/DEFICIT	7999	5052	2573	2257	2635	5591	5863	5390	5728	5383	3146
1973 FED FIRM SURPLUS/DEFICIT	7987	7333	2571	2838	3398	5448	5538	4417	2093	1302	1383
1974 FED FIRM SURPLUS/DEFICIT	2384	2423	2565	1564	1291	6223	5856	5728	5770	5171	3050
1975 FED FIRM SURPLUS/DEFICIT	8003	6483	2798	2780	3348	3745	5859	5552	5924	4205	3307
1976 FED FIRM SURPLUS/DEFICIT	4067	5098	2573	3304	5041	6360	5864	5421	5693	5275	3361
1977 FED FIRM SURPLUS/DEFICIT	7984	8524	7031	3252	3644	4753	2664	707	1379	2936	3246
1978 FED FIRM SURPLUS/DEFICIT	2517	2619	2481	1475	2155	3987	5782	5323	5740	5188	3301
***Less cold weather adjustment**					**-1400**	**-1500**	**-1500**	**-1500**			
***Less SOR 5b reduction**	**-1100**	**-1100**	**-1400**	**-50**	**0**	**-500**	**-750**	**-600**	**-1600**	**-3400**	**-2800**
***Add replacement of firm energy deficit**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**
***Add firm capacity to meet Fed firm energy loads at C-E ratio of .77**	**7.6**	**7.6**	**7.6**	**7.6**	**7.6**	**7.6**	**7.6**	**7.6**	**7.6**	**7.6**	**7.6**

1993-94
OPERATING YEAR RUN
DATE: 03/05/93 MEDIUM LOAD FORECAST

PEAK IN MEGAWATTS	**AUG**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**	**JAN**	**FEB**	**MAR**	**APR**	**APR**
ADJUSTED	**1-15**	**16-31**								**1-15**	**16-30**
1929 FED FIRM SURPLUS/DEFICIT	**6432**	**3489**	**3356**	**4389**	**3300**	**3756**	**954**	**537**	**1573**	**-314**	**1283**
1930 FED FIRM SURPLUS/DEFICIT	**3310**	**3344**	**2458**	**3057**	**2862**	**2784**	**671**	**-685**	**1225**	**437**	**1185**
1931 FED FIRM SURPLUS/DEFICIT	**5454**	**4159**	**2425**	**3201**	**2765**	**3292**	**594**	**-954**	**548**	**2208**	**411**
1932 FED FIRM SURPLUS/DEFICIT	**2493**	**3114**	**2357**	**2702**	**1613**	**2264**	**3634**	**4479**	**5112**	**2970**	**1666**
1933 FED FIRM SURPLUS/DEFICIT	**4970**	**5683**	**3979**	**4426**	**3037**	**4049**	**4892**	**4644**	**5356**	**2908**	**1801**
1934 FED FIRM SURPLUS/DEFICIT	**8098**	**7187**	**3823**	**4781**	**6135**	**5628**	**4882**	**4683**	**5445**	**3237**	**2000**
1935 FED FIRM SURPLUS/DEFICIT	**3894**	**3770**	**4015**	**4109**	**2913**	**3743**	**4844**	**5267**	**4022**	**2102**	**2060**
1936 FED FIRM SURPLUS/DEFICIT	**6895**	**3552**	**4001**	**4552**	**3841**	**4112**	**4489**	**3022**	**5113**	**3255**	**2157**
1937 FED FIRM SURPLUS/DEFICIT	**3602**	**3415**	**3508**	**4666**	**3959**	**3747**	**445**	**1263**	**1492**	**760**	**1453**
1938 FED FIRM SURPLUS/DEFICIT	**2576**	**2781**	**2413**	**2762**	**428**	**2456**	**4875**	**4616**	**5476**	**3079**	**1724**
1939 FED FIRM SURPLUS/DEFICIT	**3101**	**2998**	**3950**	**4729**	**3647**	**3594**	**3164**	**-382**	**5694**	**4080**	**2673**
1940 FED FIRM SURPLUS/DEFICIT	**4593**	**3576**	**3834**	**4853**	**4039**	**3823**	**3657**	**120**	**5873**	**4893**	**3450**
1941 FED FIRM SURPLUS/DEFICIT	**4222**	**3569**	**2522**	**3321**	**3008**	**3278**	**1438**	**1664**	**1590**	**2891**	**2093**

1942 FED FIRM SURPLUS/DEFICIT	**5141**	**5055**	**2401**	**3032**	**3230**	**5579**	**4876**	**5280**	**3690**	**3850**	**2**
1943 FED FIRM SURPLUS/DEFICIT	**6054**	**4121**	**4021**	**4700**	**3337**	**3830**	**4899**	**4695**	**5464**	**3247**	**1**
1944 FED FIRM SURPLUS/DEFICIT	**6398**	**3267**	**3597**	**4463**	**3754**	**3745**	**614**	**49**	**342**	**973**	**1**
1945 FED FIRM SURPLUS/DEFICIT	**2859**	**2695**	**2466**	**2814**	**1858**	**2482**	**1750**	**390**	**1801**	**1919**	
1946 FED FIRM SURPLUS/DEFICIT	**2591**	**2634**	**2470**	**2825**	**1989**	**2157**	**4918**	**4694**	**5493**	**2965**	**1**
1947 FED FIRM SURPLUS/DEFICIT	**6228**	**3919**	**3960**	**4585**	**3186**	**5547**	**4926**	**4726**	**5556**	**3183**	**2**
1948 FED FIRM SURPLUS/DEFICIT	**4891**	**2958**	**3739**	**6841**	**4935**	**5361**	**4919**	**4693**	**5398**	**3123**	**1**
1949 FED FIRM SURPLUS/DEFICIT	**7796**	**7248**	**4008**	**4481**	**3576**	**4034**	**4919**	**4891**	**5726**	**3519**	**2**
1950 FED FIRM SURPLUS/DEFICIT	**2593**	**2633**	**2457**	**2819**	**1643**	**3883**	**4919**	**4662**	**5400**	**3150**	**1**
1951 FED FIRM SURPLUS/DEFICIT	**7978**	**6515**	**3724**	**5547**	**5571**	**5677**	**4927**	**4697**	**5466**	**3209**	**1**
1952 FED FIRM SURPLUS/DEFICIT	**8060**	**4545**	**3326**	**6391**	**3247**	**5247**	**4914**	**4819**	**5646**	**3435**	**2**
1953 FED FIRM SURPLUS/DEFICIT	**5509**	**2633**	**3643**	**4500**	**3916**	**4023**	**4926**	**4746**	**4692**	**2647**	**1**
1954 FED FIRM SURPLUS/DEFICIT	**5913**	**5051**	**3650**	**4564**	**3137**	**3847**	**4923**	**4676**	**5381**	**3105**	**1**
1955 FED FIRM SURPLUS/DEFICIT	**8189**	**8637**	**6005**	**4473**	**3776**	**4869**	**4914**	**5098**	**4882**	**3704**	
1956 FED FIRM SURPLUS/DEFICIT	**7022**	**3248**	**3460**	**3383**	**4426**	**5676**	**4924**	**4690**	**5393**	**3105**	**1**
1957 FED FIRM SURPLUS/DEFICIT	**6667**	**5369**	**2463**	**3149**	**2470**	**5269**	**4920**	**4851**	**5684**	**3472**	**2**
1958 FED FIRM SURPLUS/DEFICIT	**2827**	**2634**	**3550**	**4529**	**3539**	**3669**	**4919**	**4858**	**5743**	**3249**	**1**
1959 FED FIRM SURPLUS/DEFICIT	**3119**	**3276**	**3574**	**4372**	**3072**	**4921**	**4921**	**4682**	**5378**	**3135**	**1**
1960 FED FIRM SURPLUS/DEFICIT	**6776**	**5155**	**7180**	**8672**	**6413**	**5520**	**4920**	**4766**	**5621**	**3455**	**1**
1961 FED FIRM SURPLUS/DEFICIT	**6030**	**2683**	**3746**	**4838**	**2868**	**3805**	**4896**	**4671**	**5434**	**3215**	**1**
1962 FED FIRM SURPLUS/DEFICIT	**3193**	**4158**	**3717**	**4495**	**3449**	**3413**	**4882**	**5069**	**5989**	**3899**	**2**
1963 FED FIRM SURPLUS/DEFICIT	**5680**	**4388**	**3581**	**4757**	**2885**	**5459**	**4924**	**5249**	**5419**	**3836**	**1**
1964 FED FIRM SURPLUS/DEFICIT	**5331**	**4216**	**4053**	**4439**	**3152**	**3689**	**4921**	**4729**	**5508**	**3256**	**1**
1965 FED FIRM SURPLUS/DEFICIT	**7084**	**4902**	**3593**	**4867**	**3789**	**5677**	**4926**	**4745**	**5512**	**3234**	**1**
1966 FED FIRM SURPLUS/DEFICIT	**7877**	**7133**	**3872**	**4649**	**3777**	**4473**	**4917**	**5331**	**5773**	**3827**	**1**
1967 FED FIRM SURPLUS/DEFICIT	**6164**	**3343**	**3675**	**4398**	**3513**	**3430**	**4914**	**4673**	**5434**	**3162**	
1968 FED FIRM SURPLUS/DEFICIT	**7643**	**5031**	**3837**	**3994**	**3145**	**4129**	**4925**	**4953**	**6023**	**2917**	
1969 FED FIRM SURPLUS/DEFICIT	**3285**	**5529**	**5449**	**6192**	**5220**	**5418**	**4914**	**4634**	**5429**	**3227**	**1**
1970 FED FIRM SURPLUS/DEFICIT	**3445**	**2621**	**2468**	**3875**	**3010**	**3490**	**4900**	**5511**	**6483**	**4059**	**1**
1971 FED FIRM SURPLUS/DEFICIT	**2593**	**2634**	**2568**	**3579**	**3034**	**3759**	**4913**	**4574**	**5342**	**2933**	**1**
1972 FED FIRM SURPLUS/DEFICIT	**8207**	**5260**	**2481**	**3515**	**2543**	**4899**	**4921**	**4598**	**5436**	**3291**	**1**
1973 FED FIRM SURPLUS/DEFICIT	**8195**	**7541**	**2479**	**4096**	**3306**	**4756**	**4596**	**3625**	**1801**	**-790**	
1974 FED FIRM SURPLUS/DEFICIT	**2592**	**2631**	**2473**	**2822**	**1199**	**5531**	**4914**	**4936**	**5478**	**3079**	**1**
1975 FED FIRM SURPLUS/DEFICIT	**8211**	**6691**	**2706**	**4038**	**3256**	**3053**	**4917**	**4760**	**5632**	**2113**	**1**
1976 FED FIRM SURPLUS/DEFICIT	**4275**	**5306**	**2481**	**4562**	**4949**	**5668**	**4922**	**4629**	**5401**	**3183**	**1**
1977 FED FIRM SURPLUS/DEFICIT	**8192**	**8732**	**6939**	**4510**	**3552**	**4061**	**1722**	**-85**	**1087**	**844**	**1**
1978 FED FIRM SURPLUS/DEFICIT	**2725**	**2827**	**2389**	**2733**	**2063**	**3295**	**4840**	**4531**	**5448**	**3096**	**1**

1994-95

OPERATING YEAR
RUN DATE: 03/05/93 MEDIUM LOAD FORECAST

PEAK IN MEGAWATTS	AUG	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	A
UNADJUSTED	1-15	16-31								1-15	16
1929 FED FIRM SURPLUS/DEFICIT	6078	3140	3296	3001	3275	4335	1745	1186	1753	1634	2
1930 FED FIRM SURPLUS/DEFICIT	2957	2995	2400	1669	2833	3363	1463	7	1409	2385	2
1931 FED FIRM SURPLUS/DEFICIT	5101	3810	2367	1811	2737	3865	1401	-288	732	4156	1
1932 FED FIRM SURPLUS/DEFICIT	2141	2767	2299	1316	1593	2847	4439	5137	5317	4918	3
1933 FED FIRM SURPLUS/DEFICIT	4617	5335	3921	3038	3046	4646	5706	5299	5535	4856	3
1934 FED FIRM SURPLUS/DEFICIT	7753	6847	3765	3411	6129	6250	5724	5357	5644	5185	3

1935 FED FIRM SURPLUS/DEFICIT	3541	3421	3956	2732	2921	4348	5660	5941	4202	4050	3414
1936 FED FIRM SURPLUS/DEFICIT	6541	3202	3940	3165	3815	4688	5305	3679	5302	5203	3511
1937 FED FIRM SURPLUS/DEFICIT	3248	3065	3449	3279	3940	4332	1235	1918	1680	2707	2807
1938 FED FIRM SURPLUS/DEFICIT	2223	2433	2352	1373	437	3061	5698	5276	5656	5027	3078
1939 FED FIRM SURPLUS/DEFICIT	2746	2647	3891	3339	3626	4188	3976	286	5880	6027	4027
1940 FED FIRM SURPLUS/DEFICIT	4239	3226	3775	3464	4010	4417	4457	800	6068	6841	4804
1941 FED FIRM SURPLUS/DEFICIT	3871	3222	2463	1932	2982	3866	2236	2318	1760	4839	3447
1942 FED FIRM SURPLUS/DEFICIT	4791	4710	2342	1651	3216	6187	5672	5941	3863	5797	3388
1943 FED FIRM SURPLUS/DEFICIT	5701	3772	3962	3315	3336	4438	5704	5369	5643	5195	3295
1944 FED FIRM SURPLUS/DEFICIT	6045	2919	3537	3073	3727	4328	1409	708	517	2921	2913
1945 FED FIRM SURPLUS/DEFICIT	2505	2346	2406	1425	1831	3061	2561	1063	1980	3867	2045
1946 FED FIRM SURPLUS/DEFICIT	2238	2284	2410	1437	1979	2752	5737	5363	5681	4913	3233
1947 FED FIRM SURPLUS/DEFICIT	5878	3573	3899	3202	3180	6156	5733	5403	5737	5130	3361
1948 FED FIRM SURPLUS/DEFICIT	4538	2610	3679	5469	4944	5959	5731	5359	5574	5071	2976
1949 FED FIRM SURPLUS/DEFICIT	7446	6902	3946	3095	3563	4625	5709	5556	5919	5467	3523
1950 FED FIRM SURPLUS/DEFICIT	2243	2287	2395	1433	1636	4479	5728	5337	5601	5098	3162
1951 FED FIRM SURPLUS/DEFICIT	7633	6174	3663	4173	5578	6302	5744	5380	5645	5157	3257
1952 FED FIRM SURPLUS/DEFICIT	7706	4195	3268	5017	3236	5843	5705	5493	5821	5383	3481
1953 FED FIRM SURPLUS/DEFICIT	5155	2284	3585	3115	3893	4591	5760	5429	4869	4595	3058
1954 FED FIRM SURPLUS/DEFICIT	5562	4705	3589	3171	3120	4464	5735	5362	5567	5053	3129
1955 FED FIRM SURPLUS/DEFICIT	7843	8297	5945	3085	3764	5457	5715	5765	5052	5652	2140
1956 FED FIRM SURPLUS/DEFICIT	6675	2905	3399	2016	4442	6295	5742	5347	5575	5053	3001
1957 FED FIRM SURPLUS/DEFICIT	6319	5025	2400	1764	2458	5879	5714	5512	5881	5420	3505
1958 FED FIRM SURPLUS/DEFICIT	2473	2284	3491	3140	3513	4265	5734	5544	5921	5197	3256
1959 FED FIRM SURPLUS/DEFICIT	2764	2925	3515	2983	3086	5536	5754	5345	5557	5084	3201
1960 FED FIRM SURPLUS/DEFICIT	6421	4805	7127	7308	6412	6119	5715	5442	5804	5403	3187
1961 FED FIRM SURPLUS/DEFICIT	5677	2334	3684	3450	2872	4398	5716	5373	5630	5163	3265
1962 FED FIRM SURPLUS/DEFICIT	2839	3809	3659	3105	3427	4014	5701	5735	6162	5847	3612
1963 FED FIRM SURPLUS/DEFICIT	5328	4040	3520	3372	2880	6067	5722	5930	5597	5784	2370
1964 FED FIRM SURPLUS/DEFICIT	4977	3866	3993	3051	3140	4282	5739	5396	5683	5204	2468
1965 FED FIRM SURPLUS/DEFICIT	6738	4561	3533	3480	3769	6291	5743	5431	5695	5181	3280
1966 FED FIRM SURPLUS/DEFICIT	7524	6784	3814	3259	3752	5053	5716	5987	5958	5775	3273
1967 FED FIRM SURPLUS/DEFICIT	5811	2994	3615	3010	3495	4041	5738	5349	5613	5110	1900
1968 FED FIRM SURPLUS/DEFICIT	7289	4683	3777	2614	3134	4724	5746	5643	6212	4865	2057
1969 FED FIRM SURPLUS/DEFICIT	2937	5182	5390	4807	5208	6030	5730	5309	5600	5176	3321
1970 FED FIRM SURPLUS/DEFICIT	3099	2271	2406	2486	2984	4071	5705	6196	6680	6007	2563
1971 FED FIRM SURPLUS/DEFICIT	2247	2283	2505	2187	3006	4347	5724	5258	5546	4881	3059
1972 FED FIRM SURPLUS/DEFICIT	7892	4920	2430	2123	2516	5488	5728	5272	5634	5239	3008
1973 FED FIRM SURPLUS/DEFICIT	7874	7202	2428	2709	3278	5338	5414	4304	1973	1158	1245
1974 FED FIRM SURPLUS/DEFICIT	2242	2282	2413	1432	1173	6134	5744	5623	5667	5026	2912
1975 FED FIRM SURPLUS/DEFICIT	7897	6355	2658	2646	3229	3635	5732	5450	5816	4061	3170
1976 FED FIRM SURPLUS/DEFICIT	3951	4961	2425	3168	4923	6272	5755	5317	5584	5131	3223
1977 FED FIRM SURPLUS/DEFICIT	7862	8390	6886	3118	3524	4635	2516	571	1256	2792	3108
1978 FED FIRM SURPLUS/DEFICIT	2371	2476	2326	1343	2034	3903	5672	5199	5627	5044	3163
***Less cold weather adjustment**					**-1400**	**-1500**	**-1500**	**-1500**			
***Less SOR 5b reduction**	**-1100**	**-1100**	**-1400**	**-50**	**0**	**-500**	**-750**	**-600**	**-1600**	**-3400**	**-2800**
***Add replacement of firm energy deficit**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**
***Add firm capacity to meet Fed firm**											

energy loads at C-E ratio of .77	193	193	193	193	193	193	193	193	193	193	
1994-95											
OPERATING YEAR RUN											
DATE: 03/05/93 MEDIUM LOAD FORECAST											
PEAK IN MEGAWATTS	AUG	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	
ADJUSTED	1-15	16-31								1-15	1
1929 FED FIRM SURPLUS/DEFICIT	6471	3533	3389	4444	3368	3828	988	579	1646	-273	1
1930 FED FIRM SURPLUS/DEFICIT	3350	3388	2493	3112	2926	2856	706	-600	1302	478	1
1931 FED FIRM SURPLUS/DEFICIT	5494	4203	2460	3254	2830	3358	644	-895	625	2249	
1932 FED FIRM SURPLUS/DEFICIT	2534	3160	2392	2759	1686	2340	3682	4530	5210	3011	1
1933 FED FIRM SURPLUS/DEFICIT	5010	5728	4014	4481	3139	4139	4949	4692	5428	2949	1
1934 FED FIRM SURPLUS/DEFICIT	8146	7240	3858	4854	6222	5743	4967	4750	5537	3278	2
1935 FED FIRM SURPLUS/DEFICIT	3934	3814	4049	4175	3014	3841	4903	5334	4095	2143	2
1936 FED FIRM SURPLUS/DEFICIT	6934	3595	4033	4608	3908	4181	4548	3072	5195	3296	2
1937 FED FIRM SURPLUS/DEFICIT	3641	3458	3542	4722	4033	3825	478	1311	1573	800	1
1938 FED FIRM SURPLUS/DEFICIT	2616	2826	2445	2816	530	2554	4941	4669	5549	3120	1
1939 FED FIRM SURPLUS/DEFICIT	3139	3040	3984	4782	3719	3681	3219	-321	5773	4120	2
1940 FED FIRM SURPLUS/DEFICIT	4632	3619	3868	4907	4103	3910	3700	193	5961	4934	3
1941 FED FIRM SURPLUS/DEFICIT	4264	3615	2556	3375	3075	3359	1479	1711	1653	2932	2
1942 FED FIRM SURPLUS/DEFICIT	5184	5103	2435	3094	3309	5680	4915	5334	3756	3890	2
1943 FED FIRM SURPLUS/DEFICIT	6094	4165	4055	4758	3429	3931	4947	4762	5536	3288	1
1944 FED FIRM SURPLUS/DEFICIT	6438	3312	3630	4516	3820	3821	652	101	410	1014	1
1945 FED FIRM SURPLUS/DEFICIT	2898	2739	2499	2868	1924	2554	1804	456	1873	1960	
1946 FED FIRM SURPLUS/DEFICIT	2631	2677	2503	2880	2072	2245	4980	4756	5574	3006	1
1947 FED FIRM SURPLUS/DEFICIT	6271	3966	3992	4645	3273	5649	4976	4796	5630	3223	2
1948 FED FIRM SURPLUS/DEFICIT	4931	3003	3772	6912	5037	5452	4974	4752	5467	3164	1
1949 FED FIRM SURPLUS/DEFICIT	7839	7295	4039	4538	3656	4118	4952	4949	5812	3560	2
1950 FED FIRM SURPLUS/DEFICIT	2636	2680	2488	2876	1729	3972	4971	4730	5494	3191	1
1951 FED FIRM SURPLUS/DEFICIT	8026	6567	3756	5616	5671	5795	4987	4773	5538	3250	1
1952 FED FIRM SURPLUS/DEFICIT	8099	4588	3361	6460	3329	5336	4948	4886	5714	3476	2
1953 FED FIRM SURPLUS/DEFICIT	5548	2677	3678	4558	3986	4084	5003	4822	4762	2688	1
1954 FED FIRM SURPLUS/DEFICIT	5955	5098	3682	4614	3213	3957	4978	4755	5460	3146	1
1955 FED FIRM SURPLUS/DEFICIT	8236	8690	6038	4528	3857	4950	4958	5158	4945	3745	
1956 FED FIRM SURPLUS/DEFICIT	7068	3298	3492	3459	4535	5788	4985	4740	5468	3146	1
1957 FED FIRM SURPLUS/DEFICIT	6712	5418	2493	3207	2551	5372	4957	4905	5774	3513	2
1958 FED FIRM SURPLUS/DEFICIT	2866	2677	3584	4583	3606	3758	4977	4937	5814	3290	1
1959 FED FIRM SURPLUS/DEFICIT	3157	3318	3608	4426	3179	5029	4997	4738	5450	3177	1
1960 FED FIRM SURPLUS/DEFICIT	6814	5198	7220	8751	6505	5612	4958	4835	5697	3496	1
1961 FED FIRM SURPLUS/DEFICIT	6070	2727	3777	4893	2965	3891	4959	4766	5523	3256	1
1962 FED FIRM SURPLUS/DEFICIT	3232	4202	3752	4548	3520	3507	4944	5128	6055	3940	2
1963 FED FIRM SURPLUS/DEFICIT	5721	4433	3613	4815	2973	5560	4965	5323	5490	3877	1
1964 FED FIRM SURPLUS/DEFICIT	5370	4259	4086	4494	3233	3775	4982	4789	5576	3297	1
1965 FED FIRM SURPLUS/DEFICIT	7131	4954	3626	4923	3862	5784	4986	4824	5588	3274	1
1966 FED FIRM SURPLUS/DEFICIT	7917	7177	3907	4702	3845	4546	4959	5380	5851	3868	1
1967 FED FIRM SURPLUS/DEFICIT	6204	3387	3708	4453	3588	3534	4981	4742	5506	3203	
1968 FED FIRM SURPLUS/DEFICIT	7682	5076	3870	4057	3227	4217	4989	5036	6105	2958	
1969 FED FIRM SURPLUS/DEFICIT	3330	5575	5483	6250	5301	5523	4973	4702	5493	3269	2
1970 FED FIRM SURPLUS/DEFICIT	3492	2664	2499	3929	3077	3564	4948	5589	6573	4100	1
1971 FED FIRM SURPLUS/DEFICIT	2640	2676	2598	3630	3099	3840	4967	4651	5439	2974	1
1972 FED FIRM SURPLUS/DEFICIT	8285	5313	2523	3566	2609	4981	4971	4665	5527	3332	1

1973 FED FIRM SURPLUS/DEFICIT	**8267**	**7595**	**2521**	**4152**	**3371**	**4831**	**4657**	**3697**	**1866**	**-749**	**-62**
1974 FED FIRM SURPLUS/DEFICIT	**2635**	**2675**	**2506**	**2875**	**1266**	**5627**	**4987**	**5016**	**5560**	**3119**	**1605**
1975 FED FIRM SURPLUS/DEFICIT	**8290**	**6748**	**2751**	**4089**	**3322**	**3128**	**4975**	**4843**	**5709**	**2154**	**1863**
1976 FED FIRM SURPLUS/DEFICIT	**4344**	**5354**	**2518**	**4611**	**5016**	**5765**	**4998**	**4710**	**5477**	**3224**	**1916**
1977 FED FIRM SURPLUS/DEFICIT	**8255**	**8783**	**6979**	**4561**	**3617**	**4128**	**1759**	**-36**	**1149**	**885**	**1801**
1978 FED FIRM SURPLUS/DEFICIT	**2764**	**2869**	**2419**	**2786**	**2127**	**3396**	**4915**	**4592**	**5520**	**3137**	**1856**

1995-96
OPERATING YEAR
RUN DATE: 03/05/93 MEDIUM LOAD FORECAST

PEAK IN MEGAWATTS	AUG	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	APR
UNADJUSTED	1-15	16-31								1-15	16-30
1929 FED FIRM SURPLUS/DEFICIT	6932	3997	4099	3811	3842	4942	2086	1553	2246	2309	3384
1930 FED FIRM SURPLUS/DEFICIT	3811	3853	3204	2480	3401	3970	1804	375	1902	3060	3286
1931 FED FIRM SURPLUS/DEFICIT	5955	4668	3171	2622	3304	4473	1742	80	1226	4831	2512
1932 FED FIRM SURPLUS/DEFICIT	2995	3624	3103	2126	2161	3454	4781	5504	5811	5593	3767
1933 FED FIRM SURPLUS/DEFICIT	5471	6193	4725	3848	3613	5253	6048	5667	6029	5531	3902
1934 FED FIRM SURPLUS/DEFICIT	8608	7705	4569	4221	6696	6858	6066	5725	6137	5860	4101
1935 FED FIRM SURPLUS/DEFICIT	4395	4279	4760	3543	3489	4955	6002	6309	4695	4725	4161
1936 FED FIRM SURPLUS/DEFICIT	7395	4060	4743	3975	4382	5295	5647	4047	5796	5878	4258
1937 FED FIRM SURPLUS/DEFICIT	4102	3923	4252	4089	4507	4939	1576	2286	2174	3383	3554
1938 FED FIRM SURPLUS/DEFICIT	3077	3290	3156	2183	1004	3668	6040	5643	6150	5702	3825
1939 FED FIRM SURPLUS/DEFICIT	3600	3505	4694	4150	4194	4796	4317	653	6374	6703	4774
1940 FED FIRM SURPLUS/DEFICIT	5093	4083	4579	4274	4577	5024	4799	1168	6561	7516	5551
1941 FED FIRM SURPLUS/DEFICIT	4725	4080	3267	2742	3549	4473	2578	2685	2253	5514	4194
1942 FED FIRM SURPLUS/DEFICIT	5645	5567	3146	2461	3784	6795	6013	6309	4356	6473	4135
1943 FED FIRM SURPLUS/DEFICIT	6555	4630	4765	4125	3904	5045	6046	5737	6137	5870	4041
1944 FED FIRM SURPLUS/DEFICIT	6900	3776	4341	3884	4294	4936	1751	1076	1010	3596	3660
1945 FED FIRM SURPLUS/DEFICIT	3360	3204	3210	2235	2399	3669	2903	1431	2474	4542	2792
1946 FED FIRM SURPLUS/DEFICIT	3092	3141	3214	2247	2546	3360	6079	5730	6174	5588	3980
1947 FED FIRM SURPLUS/DEFICIT	6732	4431	4703	4013	3747	6764	6075	5771	6231	5806	4108
1948 FED FIRM SURPLUS/DEFICIT	5392	3467	4483	6279	5511	6567	6073	5727	6067	5746	3723
1949 FED FIRM SURPLUS/DEFICIT	8300	7760	4750	3905	4130	5233	6051	5923	6412	6142	4270
1950 FED FIRM SURPLUS/DEFICIT	3097	3144	3199	2243	2203	5087	6070	5704	6095	5773	3909
1951 FED FIRM SURPLUS/DEFICIT	8487	7032	4466	4984	6145	6910	6086	5748	6139	5832	4004
1952 FED FIRM SURPLUS/DEFICIT	8560	5053	4072	5828	3803	6450	6047	5859	6314	6058	4228
1953 FED FIRM SURPLUS/DEFICIT	6009	3141	4388	3925	4461	5198	6102	5796	5363	5270	3805
1954 FED FIRM SURPLUS/DEFICIT	6416	5563	4392	3982	3688	5072	6077	5730	6061	5728	3876
1955 FED FIRM SURPLUS/DEFICIT	8697	9154	6748	3895	4331	6064	6057	6133	5546	6327	2887
1956 FED FIRM SURPLUS/DEFICIT	7529	3763	4203	2826	5010	6903	6084	5715	6069	5728	3748
1957 FED FIRM SURPLUS/DEFICIT	7173	5883	3203	2575	3025	6487	6056	5879	6374	6095	4252
1958 FED FIRM SURPLUS/DEFICIT	3327	3141	4295	3950	4080	4872	6076	5912	6415	5872	4003
1959 FED FIRM SURPLUS/DEFICIT	3618	3783	4318	3793	3654	6144	6096	5713	6050	5758	3948
1960 FED FIRM SURPLUS/DEFICIT	7275	5663	7930	8119	6979	6727	6057	5810	6298	6078	3934
1961 FED FIRM SURPLUS/DEFICIT	6531	3191	4487	4261	3440	5006	6057	5741	6123	5838	4012
1962 FED FIRM SURPLUS/DEFICIT	3694	4667	4462	3916	3994	4621	6043	6103	6655	6522	4359
1963 FED FIRM SURPLUS/DEFICIT	6182	4897	4324	4182	3448	6674	6064	6298	6091	6459	3117
1964 FED FIRM SURPLUS/DEFICIT	5831	4724	4797	3862	3708	4889	6081	5764	6177	5879	3215
1965 FED FIRM SURPLUS/DEFICIT	7593	5419	4337	4290	4337	6898	6085	5799	6189	5857	4027

1966 FED FIRM SURPLUS/DEFICIT	8378	7641	4618	4070	4319	5661	6058	6354	6452	6450	4
1967 FED FIRM SURPLUS/DEFICIT	6665	3851	4419	3820	4062	4648	6080	5717	6106	5785	2
1968 FED FIRM SURPLUS/DEFICIT	8143	5540	4580	3425	3701	5332	6088	6011	6706	5540	2
1969 FED FIRM SURPLUS/DEFICIT	3791	6039	6194	5617	5775	6638	6072	5677	6094	5851	4
1970 FED FIRM SURPLUS/DEFICIT	3953	3128	3210	3296	3551	4679	6047	6564	7174	6682	3
1971 FED FIRM SURPLUS/DEFICIT	3101	3140	3309	2997	3573	4955	6066	5626	6039	5556	3
1972 FED FIRM SURPLUS/DEFICIT	8746	5778	3233	2934	3084	6096	6070	5640	6128	5914	3
1973 FED FIRM SURPLUS/DEFICIT	8728	8060	3231	3519	3845	5946	5756	4671	2466	1833	1
1974 FED FIRM SURPLUS/DEFICIT	3096	3139	3217	2242	1740	6742	6086	5991	6161	5701	3
1975 FED FIRM SURPLUS/DEFICIT	8751	7213	3462	3457	3796	4242	6074	5818	6310	4736	3
1976 FED FIRM SURPLUS/DEFICIT	4805	5819	3228	3979	5490	6880	6097	5685	6078	5806	3
1977 FED FIRM SURPLUS/DEFICIT	8716	9248	7689	3928	4091	5242	2857	939	1749	3467	3
1978 FED FIRM SURPLUS/DEFICIT	3225	3333	3130	2153	2601	4511	6014	5567	6120	5719	3
***Less PP&L contract**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1**
***Less cold weather adjustment**					**-1400**	**-1500**	**-1500**	**-1500**			
***Less SOR 5b reduction**	**-1100**	**-1100**	**-1400**	**-50**	**0**	**-500**	**-750**	**-600**	**-1600**	**-3400**	**-2**
***Add replacement of firm energy deficit**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1**
***Add firm capacity to meet Fed firm energy loads at C-E ratio of .76**	**419**	**419**	**419**	**419**	**419**	**419**	**419**	**419**	**419**	**419**	

1995-96
OPERATING YEAR RUN
DATE: 03/05/93 MEDIUM LOAD FORECAST

PEAK IN MEGAWATTS	**AUG**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**	**JAN**	**FEB**	**MAR**	**APR**	
ADJUSTED	**1-15**	**16-31**								**1-15**	**1**
1929 FED FIRM SURPLUS/DEFICIT	**6451**	**3516**	**3318**	**4380**	**3061**	**3561**	**455**	**72**	**1265**	**-472**	**1**
1930 FED FIRM SURPLUS/DEFICIT	**3330**	**3372**	**2423**	**3049**	**2620**	**2589**	**173**	**-1106**	**921**	**279**	**1**
1931 FED FIRM SURPLUS/DEFICIT	**5474**	**4187**	**2390**	**3191**	**2523**	**3092**	**111**	**-1401**	**245**	**2050**	
1932 FED FIRM SURPLUS/DEFICIT	**2514**	**3143**	**2322**	**2695**	**1380**	**2073**	**3150**	**4023**	**4830**	**2812**	**1**
1933 FED FIRM SURPLUS/DEFICIT	**4990**	**5712**	**3944**	**4417**	**2832**	**3872**	**4417**	**4186**	**5048**	**2750**	**1**
1934 FED FIRM SURPLUS/DEFICIT	**8127**	**7224**	**3788**	**4790**	**5915**	**5477**	**4435**	**4244**	**5156**	**3079**	**1**
1935 FED FIRM SURPLUS/DEFICIT	**3914**	**3798**	**3979**	**4112**	**2708**	**3574**	**4371**	**4828**	**3714**	**1944**	**1**
1936 FED FIRM SURPLUS/DEFICIT	**6914**	**3579**	**3962**	**4544**	**3601**	**3914**	**4016**	**2566**	**4815**	**3097**	**2**
1937 FED FIRM SURPLUS/DEFICIT	**3621**	**3442**	**3471**	**4658**	**3726**	**3558**	**-55**	**805**	**1193**	**602**	**1**
1938 FED FIRM SURPLUS/DEFICIT	**2596**	**2809**	**2375**	**2752**	**223**	**2287**	**4409**	**4162**	**5169**	**2921**	**1**
1939 FED FIRM SURPLUS/DEFICIT	**3119**	**3024**	**3913**	**4719**	**3413**	**3415**	**2686**	**-828**	**5393**	**3922**	**2**
1940 FED FIRM SURPLUS/DEFICIT	**4612**	**3602**	**3798**	**4843**	**3796**	**3643**	**3168**	**-313**	**5580**	**4735**	**3**
1941 FED FIRM SURPLUS/DEFICIT	**4244**	**3599**	**2486**	**3311**	**2768**	**3092**	**947**	**1204**	**1272**	**2733**	**2**
1942 FED FIRM SURPLUS/DEFICIT	**5164**	**5086**	**2365**	**3030**	**3003**	**5414**	**4382**	**4828**	**3375**	**3692**	**1**
1943 FED FIRM SURPLUS/DEFICIT	**6074**	**4149**	**3984**	**4694**	**3123**	**3664**	**4415**	**4256**	**5156**	**3089**	**1**
1944 FED FIRM SURPLUS/DEFICIT	**6419**	**3295**	**3560**	**4453**	**3513**	**3555**	**120**	**-405**	**29**	**815**	**1**
1945 FED FIRM SURPLUS/DEFICIT	**2879**	**2723**	**2429**	**2804**	**1618**	**2288**	**1272**	**-50**	**1493**	**1761**	
1946 FED FIRM SURPLUS/DEFICIT	**2611**	**2660**	**2433**	**2816**	**1765**	**1979**	**4448**	**4249**	**5193**	**2807**	**1**
1947 FED FIRM SURPLUS/DEFICIT	**6251**	**3950**	**3922**	**4582**	**2966**	**5383**	**4444**	**4290**	**5250**	**3025**	**1**
1948 FED FIRM SURPLUS/DEFICIT	**4911**	**2986**	**3702**	**6848**	**4730**	**5186**	**4442**	**4246**	**5086**	**2965**	**1**
1949 FED FIRM SURPLUS/DEFICIT	**7819**	**7279**	**3969**	**4474**	**3349**	**3852**	**4420**	**4442**	**5431**	**3361**	**2**
1950 FED FIRM SURPLUS/DEFICIT	**2616**	**2663**	**2418**	**2812**	**1422**	**3706**	**4439**	**4223**	**5114**	**2992**	**1**
1951 FED FIRM SURPLUS/DEFICIT	**8006**	**6551**	**3685**	**5553**	**5364**	**5529**	**4455**	**4267**	**5158**	**3051**	**1**
1952 FED FIRM SURPLUS/DEFICIT	**8079**	**4572**	**3291**	**6397**	**3022**	**5069**	**4416**	**4378**	**5333**	**3277**	**2**

1953 FED FIRM SURPLUS/DEFICIT	**5528**	**2660**	**3607**	**4494**	**3680**	**3817**	**4471**	**4315**	**4382**	**2489**	**1624**
1954 FED FIRM SURPLUS/DEFICIT	**5935**	**5082**	**3611**	**4551**	**2907**	**3691**	**4446**	**4249**	**5080**	**2947**	**1695**
1955 FED FIRM SURPLUS/DEFICIT	**8216**	**8673**	**5967**	**4464**	**3550**	**4683**	**4426**	**4652**	**4565**	**3546**	**706**
1956 FED FIRM SURPLUS/DEFICIT	**7048**	**3282**	**3422**	**3395**	**4229**	**5522**	**4453**	**4234**	**5088**	**2947**	**1567**
1957 FED FIRM SURPLUS/DEFICIT	**6692**	**5402**	**2422**	**3144**	**2244**	**5106**	**4425**	**4398**	**5393**	**3314**	**2071**
1958 FED FIRM SURPLUS/DEFICIT	**2846**	**2660**	**3514**	**4519**	**3299**	**3491**	**4445**	**4431**	**5434**	**3091**	**1822**
1959 FED FIRM SURPLUS/DEFICIT	**3137**	**3302**	**3537**	**4362**	**2873**	**4763**	**4465**	**4232**	**5069**	**2977**	**1767**
1960 FED FIRM SURPLUS/DEFICIT	**6794**	**5182**	**7149**	**8688**	**6198**	**5346**	**4426**	**4329**	**5317**	**3297**	**1753**
1961 FED FIRM SURPLUS/DEFICIT	**6050**	**2710**	**3706**	**4830**	**2659**	**3625**	**4426**	**4260**	**5142**	**3057**	**1831**
1962 FED FIRM SURPLUS/DEFICIT	**3213**	**4186**	**3681**	**4485**	**3213**	**3240**	**4412**	**4622**	**5674**	**3741**	**2178**
1963 FED FIRM SURPLUS/DEFICIT	**5701**	**4416**	**3543**	**4751**	**2667**	**5293**	**4433**	**4817**	**5110**	**3678**	**936**
1964 FED FIRM SURPLUS/DEFICIT	**5350**	**4243**	**4016**	**4431**	**2927**	**3508**	**4450**	**4283**	**5196**	**3098**	**1034**
1965 FED FIRM SURPLUS/DEFICIT	**7112**	**4938**	**3556**	**4859**	**3556**	**5517**	**4454**	**4318**	**5208**	**3076**	**1846**
1966 FED FIRM SURPLUS/DEFICIT	**7897**	**7160**	**3837**	**4639**	**3538**	**4280**	**4427**	**4873**	**5471**	**3669**	**1839**
1967 FED FIRM SURPLUS/DEFICIT	**6184**	**3370**	**3638**	**4389**	**3281**	**3267**	**4449**	**4236**	**5125**	**3004**	**466**
1968 FED FIRM SURPLUS/DEFICIT	**7662**	**5059**	**3799**	**3994**	**2920**	**3951**	**4457**	**4530**	**5725**	**2759**	**623**
1969 FED FIRM SURPLUS/DEFICIT	**3310**	**5558**	**5413**	**6186**	**4994**	**5257**	**4441**	**4196**	**5113**	**3070**	**1887**
1970 FED FIRM SURPLUS/DEFICIT	**3472**	**2647**	**2429**	**3865**	**2770**	**3298**	**4416**	**5083**	**6193**	**3901**	**1129**
1971 FED FIRM SURPLUS/DEFICIT	**2620**	**2659**	**2528**	**3566**	**2792**	**3574**	**4435**	**4145**	**5058**	**2775**	**1625**
1972 FED FIRM SURPLUS/DEFICIT	**8265**	**5297**	**2452**	**3503**	**2303**	**4715**	**4439**	**4159**	**5147**	**3133**	**1573**
1973 FED FIRM SURPLUS/DEFICIT	**8247**	**7579**	**2450**	**4088**	**3064**	**4565**	**4125**	**3190**	**1485**	**-948**	**-189**
1974 FED FIRM SURPLUS/DEFICIT	**2615**	**2658**	**2436**	**2811**	**959**	**5361**	**4455**	**4510**	**5180**	**2920**	**1477**
1975 FED FIRM SURPLUS/DEFICIT	**8270**	**6732**	**2681**	**4026**	**3015**	**2861**	**4443**	**4337**	**5329**	**1955**	**1735**
1976 FED FIRM SURPLUS/DEFICIT	**4324**	**5338**	**2447**	**4548**	**4709**	**5499**	**4466**	**4204**	**5097**	**3025**	**1789**
1977 FED FIRM SURPLUS/DEFICIT	**8235**	**8767**	**6908**	**4497**	**3310**	**3861**	**1226**	**-542**	**768**	**686**	**1674**
1978 FED FIRM SURPLUS/DEFICIT	**2744**	**2852**	**2349**	**2722**	**1820**	**3130**	**4383**	**4086**	**5139**	**2938**	**1729**

1996-97
OPERATING YEAR
RUN DATE: 03/05/93 MEDIUM LOAD FORECAST

PEAK IN MEGAWATTS	AUG	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	APR
UNADJUSTED	1-15	16-31								1-15	16-30
1929 FED FIRM SURPLUS/DEFICIT	6981	4046	4116	3743	3844	4906	2200	1661	2353	2659	3729
1930 FED FIRM SURPLUS/DEFICIT	3859	3901	3220	2412	3402	3934	1918	482	2009	3409	3632
1931 FED FIRM SURPLUS/DEFICIT	6003	4716	3187	2554	3306	4437	1856	187	1332	5180	2857
1932 FED FIRM SURPLUS/DEFICIT	3043	3672	3119	2058	2162	3418	4894	5612	5918	5941	4112
1933 FED FIRM SURPLUS/DEFICIT	5519	6241	4741	3780	3615	5217	6161	5774	6136	5880	4248
1934 FED FIRM SURPLUS/DEFICIT	8656	7753	4586	4153	6698	6822	6179	5832	6244	6210	4446
1935 FED FIRM SURPLUS/DEFICIT	4443	4327	4776	3475	3490	4919	6115	6417	4802	5075	4506
1936 FED FIRM SURPLUS/DEFICIT	7443	4108	4760	3907	4384	5259	5760	4154	5902	6228	4603
1937 FED FIRM SURPLUS/DEFICIT	4150	3971	4269	4021	4509	4903	1690	2393	2280	3732	3899
1938 FED FIRM SURPLUS/DEFICIT	3125	3339	3172	2115	1006	3632	6154	5751	6256	6051	4171
1939 FED FIRM SURPLUS/DEFICIT	3648	3553	4711	4082	4195	4760	4431	761	6480	7052	5119
1940 FED FIRM SURPLUS/DEFICIT	5141	4132	4596	4206	4579	4988	4912	1275	6668	7865	5896
1941 FED FIRM SURPLUS/DEFICIT	4773	4128	3284	2674	3551	4437	2691	2793	2360	5863	4540
1942 FED FIRM SURPLUS/DEFICIT	5694	5615	3162	2394	3785	6759	6127	6416	4463	6822	4480
1943 FED FIRM SURPLUS/DEFICIT	6603	4678	4782	4057	3905	5009	6159	5845	6244	6220	4387
1944 FED FIRM SURPLUS/DEFICIT	6948	3825	4358	3816	4296	4900	1864	1183	1117	3946	4005
1945 FED FIRM SURPLUS/DEFICIT	3408	3252	3226	2167	2400	3633	3016	1538	2581	4891	3138

1946 FED FIRM SURPLUS/DEFICIT	3140	3190	3230	2179	2548	3324	6192	5838	6281	5937	4
1947 FED FIRM SURPLUS/DEFICIT	6780	4479	4720	3945	3749	6728	6188	5879	6337	6155	4
1948 FED FIRM SURPLUS/DEFICIT	5440	3515	4499	6211	5513	6531	6186	5834	6174	6095	4
1949 FED FIRM SURPLUS/DEFICIT	8348	7808	4766	3838	4132	5197	6164	6031	6519	6491	4
1950 FED FIRM SURPLUS/DEFICIT	3145	3193	3215	2175	2205	5051	6183	5812	6201	6123	4
1951 FED FIRM SURPLUS/DEFICIT	8535	7080	4483	4916	6147	6874	6199	5855	6246	6181	4
1952 FED FIRM SURPLUS/DEFICIT	8608	5101	4088	5760	3805	6414	6160	5968	6421	6407	4
1953 FED FIRM SURPLUS/DEFICIT	6058	3190	4405	3857	4462	5162	6215	5904	5469	5620	4
1954 FED FIRM SURPLUS/DEFICIT	6465	5611	4409	3914	3689	5036	6190	5838	6168	6078	4
1955 FED FIRM SURPLUS/DEFICIT	8745	9203	6765	3827	4333	6028	6170	6241	5653	6676	3
1956 FED FIRM SURPLUS/DEFICIT	7577	3811	4219	2758	5011	6867	6197	5822	6175	6077	4
1957 FED FIRM SURPLUS/DEFICIT	7221	5931	3220	2507	3026	6451	6169	5987	6481	6444	4
1958 FED FIRM SURPLUS/DEFICIT	3375	3190	4312	3883	4081	4836	6189	6019	6521	6221	4
1959 FED FIRM SURPLUS/DEFICIT	3666	3831	4335	3725	3655	6108	6209	5821	6157	6107	4
1960 FED FIRM SURPLUS/DEFICIT	7324	5711	7947	8051	6980	6691	6170	5917	6405	6427	4
1961 FED FIRM SURPLUS/DEFICIT	6579	3239	4504	4193	3441	4970	6171	5848	6230	6188	4
1962 FED FIRM SURPLUS/DEFICIT	3742	4715	4479	3848	3996	4585	6156	6210	6762	6872	4
1963 FED FIRM SURPLUS/DEFICIT	6230	4946	4340	4114	3449	6638	6177	6406	6197	6808	3
1964 FED FIRM SURPLUS/DEFICIT	5879	4772	4814	3794	3709	4853	6194	5871	6284	6229	3
1965 FED FIRM SURPLUS/DEFICIT	7641	5467	4354	4222	4338	6862	6198	5906	6295	6206	4
1966 FED FIRM SURPLUS/DEFICIT	8427	7690	4634	4002	4321	5625	6171	6462	6559	6800	4
1967 FED FIRM SURPLUS/DEFICIT	6713	3899	4436	3752	4063	4612	6193	5824	6213	6134	2
1968 FED FIRM SURPLUS/DEFICIT	8191	5588	4597	3357	3703	5296	6201	6118	6812	5889	3
1969 FED FIRM SURPLUS/DEFICIT	3839	6088	6210	5550	5777	6602	6185	5784	6200	6199	4
1970 FED FIRM SURPLUS/DEFICIT	4001	3177	3227	3228	3553	4643	6160	6671	7280	7032	3
1971 FED FIRM SURPLUS/DEFICIT	3149	3189	3325	2929	3575	4919	6179	5733	6146	5906	4
1972 FED FIRM SURPLUS/DEFICIT	8794	5826	3250	2866	3085	6060	6183	5747	6234	6263	4
1973 FED FIRM SURPLUS/DEFICIT	8776	8108	3248	3451	3846	5910	5869	4779	2573	2182	2
1974 FED FIRM SURPLUS/DEFICIT	3144	3188	3233	2174	1741	6706	6199	6100	6267	6050	4
1975 FED FIRM SURPLUS/DEFICIT	8800	7261	3478	3389	3798	4206	6187	5925	6416	5085	4
1976 FED FIRM SURPLUS/DEFICIT	4853	5867	3245	3911	5492	6844	6210	5793	6184	6155	4
1977 FED FIRM SURPLUS/DEFICIT	8764	9296	7706	3861	4093	5206	2971	1046	1856	3816	4
1978 FED FIRM SURPLUS/DEFICIT	3273	3382	3146	2085	2603	4475	6127	5674	6227	6068	4
***Less PP&L contract**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1**
***Less cold weather adjustment**					**-1400**	**-1500**	**-1500**	**-1500**			
***Less SOR 5b reduction**	**-1100**	**-1100**	**-1400**	**-50**	**0**	**-500**	**-750**	**-600**	**-1600**	**-3400**	**-2**
***Add replacement of firm energy deficit**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1**
***Add firm capacity to meet Fed firm energy loads at C-E ratio of .67**	**369**	**369**	**369**	**369**	**369**	**369**	**369**	**369**	**369**	**369**	

1996-97
OPERATING YEAR RUN
DATE: 03/05/93 MEDIUM LOAD FORECAST

PEAK IN MEGAWATTS	**AUG**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**	**JAN**	**FEB**	**MAR**	**APR**	
ADJUSTED	**1-15**	**16-31**								**1-15**	**1**
1929 FED FIRM SURPLUS/DEFICIT	**6450**	**3515**	**3285**	**4262**	**3013**	**3475**	**519**	**130**	**1322**	**-172**	**1**
1930 FED FIRM SURPLUS/DEFICIT	**3328**	**3370**	**2389**	**2931**	**2571**	**2503**	**237**	**-1049**	**978**	**578**	**1**
1931 FED FIRM SURPLUS/DEFICIT	**5472**	**4185**	**2356**	**3073**	**2475**	**3006**	**175**	**-1344**	**301**	**2349**	

1932 FED FIRM SURPLUS/DEFICIT	2512	3141	2288	2577	1331	1987	3213	4081	4887	3110	1881
1933 FED FIRM SURPLUS/DEFICIT	4988	5710	3910	4299	2784	3786	4480	4243	5105	3049	2017
1934 FED FIRM SURPLUS/DEFICIT	8125	7222	3755	4672	5867	5391	4498	4301	5213	3379	2215
1935 FED FIRM SURPLUS/DEFICIT	3912	3796	3945	3994	2659	3488	4434	4886	3771	2244	2275
1936 FED FIRM SURPLUS/DEFICIT	6912	3577	3929	4426	3553	3828	4079	2623	4871	3397	2372
1937 FED FIRM SURPLUS/DEFICIT	3619	3440	3438	4540	3678	3472	9	862	1249	901	1668
1938 FED FIRM SURPLUS/DEFICIT	2594	2808	2341	2634	175	2201	4473	4220	5225	3220	1940
1939 FED FIRM SURPLUS/DEFICIT	3117	3022	3880	4601	3364	3329	2750	-770	5449	4221	2888
1940 FED FIRM SURPLUS/DEFICIT	4610	3601	3765	4725	3748	3557	3231	-256	5637	5034	3665
1941 FED FIRM SURPLUS/DEFICIT	4242	3597	2453	3193	2720	3006	1010	1262	1329	3032	2309
1942 FED FIRM SURPLUS/DEFICIT	5163	5084	2331	2913	2954	5328	4446	4885	3432	3991	2249
1943 FED FIRM SURPLUS/DEFICIT	6072	4147	3951	4576	3074	3578	4478	4314	5213	3389	2156
1944 FED FIRM SURPLUS/DEFICIT	6417	3294	3527	4335	3465	3469	183	-348	86	1115	1774
1945 FED FIRM SURPLUS/DEFICIT	2877	2721	2395	2686	1569	2202	1335	7	1550	2060	907
1946 FED FIRM SURPLUS/DEFICIT	2609	2659	2399	2698	1717	1893	4511	4307	5250	3106	2094
1947 FED FIRM SURPLUS/DEFICIT	6249	3948	3889	4464	2918	5297	4507	4348	5306	3324	2223
1948 FED FIRM SURPLUS/DEFICIT	4909	2984	3668	6730	4682	5100	4505	4303	5143	3264	1837
1949 FED FIRM SURPLUS/DEFICIT	7817	7277	3935	4357	3301	3766	4483	4500	5488	3660	2384
1950 FED FIRM SURPLUS/DEFICIT	2614	2662	2384	2694	1374	3620	4502	4281	5170	3292	2024
1951 FED FIRM SURPLUS/DEFICIT	8004	6549	3652	5435	5316	5443	4518	4324	5215	3350	2118
1952 FED FIRM SURPLUS/DEFICIT	8077	4570	3257	6279	2974	4983	4479	4437	5390	3576	2343
1953 FED FIRM SURPLUS/DEFICIT	5527	2659	3574	4376	3631	3731	4534	4373	4438	2789	1919
1954 FED FIRM SURPLUS/DEFICIT	5934	5080	3578	4433	2858	3605	4509	4307	5137	3247	1991
1955 FED FIRM SURPLUS/DEFICIT	8214	8672	5934	4346	3502	4597	4489	4710	4622	3845	1002
1956 FED FIRM SURPLUS/DEFICIT	7046	3280	3388	3277	4180	5436	4516	4291	5144	3246	1862
1957 FED FIRM SURPLUS/DEFICIT	6690	5400	2389	3026	2195	5020	4488	4456	5450	3613	2366
1958 FED FIRM SURPLUS/DEFICIT	2844	2659	3481	4402	3250	3405	4508	4488	5490	3390	2117
1959 FED FIRM SURPLUS/DEFICIT	3135	3300	3504	4244	2824	4677	4528	4290	5126	3276	2062
1960 FED FIRM SURPLUS/DEFICIT	6793	5180	7116	8570	6149	5260	4489	4386	5374	3596	2048
1961 FED FIRM SURPLUS/DEFICIT	6048	2708	3673	4712	2610	3539	4490	4317	5199	3357	2126
1962 FED FIRM SURPLUS/DEFICIT	3211	4184	3648	4367	3165	3154	4475	4679	5731	4041	2473
1963 FED FIRM SURPLUS/DEFICIT	5699	4415	3509	4633	2618	5207	4496	4875	5166	3977	1232
1964 FED FIRM SURPLUS/DEFICIT	5348	4241	3983	4313	2878	3422	4513	4340	5253	3398	1329
1965 FED FIRM SURPLUS/DEFICIT	7110	4936	3523	4741	3507	5431	4517	4375	5264	3375	2141
1966 FED FIRM SURPLUS/DEFICIT	7896	7159	3803	4521	3490	4194	4490	4931	5528	3969	2134
1967 FED FIRM SURPLUS/DEFICIT	6182	3368	3605	4271	3232	3181	4512	4293	5182	3303	762
1968 FED FIRM SURPLUS/DEFICIT	7660	5057	3766	3876	2872	3865	4520	4587	5781	3058	918
1969 FED FIRM SURPLUS/DEFICIT	3308	5557	5379	6069	4946	5171	4504	4253	5169	3368	2183
1970 FED FIRM SURPLUS/DEFICIT	3470	2646	2396	3747	2722	3212	4479	5140	6249	4201	1424
1971 FED FIRM SURPLUS/DEFICIT	2618	2658	2494	3448	2744	3488	4498	4202	5115	3075	1921
1972 FED FIRM SURPLUS/DEFICIT	8263	5295	2419	3385	2254	4629	4502	4216	5203	3432	1869
1973 FED FIRM SURPLUS/DEFICIT	8245	7577	2417	3970	3015	4479	4188	3248	1542	-649	106
1974 FED FIRM SURPLUS/DEFICIT	2613	2657	2402	2693	910	5275	4518	4569	5236	3219	1773
1975 FED FIRM SURPLUS/DEFICIT	8269	6730	2647	3908	2967	2775	4506	4394	5385	2254	2031
1976 FED FIRM SURPLUS/DEFICIT	4322	5336	2414	4430	4661	5413	4529	4262	5153	3324	2085
1977 FED FIRM SURPLUS/DEFICIT	8233	8765	6875	4380	3262	3775	1290	-485	825	985	1969
1978 FED FIRM SURPLUS/DEFICIT	2742	2851	2315	2604	1772	3044	4446	4143	5196	3237	2025

1997-98
OPERATING YEAR
RUN DATE: 03/05/93 MEDIUM LOAD FORECAST

PEAK IN MEGAWATTS	AUG	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	A
UNADJUSTED	1-15	16-31								1-15	16
1929 FED FIRM SURPLUS/DEFICIT	6901	3965	4042	3653	3724	4771	2056	1530	2237	2518	3
1930 FED FIRM SURPLUS/DEFICIT	3779	3821	3146	2322	3282	3799	1774	351	1893	3269	3
1931 FED FIRM SURPLUS/DEFICIT	5924	4636	3113	2464	3185	4302	1712	56	1217	5039	2
1932 FED FIRM SURPLUS/DEFICIT	2963	3592	3045	1969	2042	3283	4751	5481	5802	5801	3
1933 FED FIRM SURPLUS/DEFICIT	5439	6161	4668	3691	3495	5082	6018	5644	6020	5739	4
1934 FED FIRM SURPLUS/DEFICIT	8576	7673	4512	4064	6578	6687	6036	5702	6129	6069	4
1935 FED FIRM SURPLUS/DEFICIT	4364	4247	4702	3385	3370	4784	5972	6286	4687	4934	4
1936 FED FIRM SURPLUS/DEFICIT	7364	4028	4686	3818	4264	5124	5617	4024	5787	6087	4
1937 FED FIRM SURPLUS/DEFICIT	4071	3890	4195	3932	4389	4768	1546	2263	2165	3591	3
1938 FED FIRM SURPLUS/DEFICIT	3045	3258	3098	2026	886	3497	6010	5620	6141	5910	4
1939 FED FIRM SURPLUS/DEFICIT	3568	3472	4637	3992	4075	4624	4287	630	6365	6911	4
1940 FED FIRM SURPLUS/DEFICIT	5061	4051	4522	4117	4459	4853	4769	1144	6552	7724	5
1941 FED FIRM SURPLUS/DEFICIT	4694	4048	3210	2585	3431	4302	2548	2662	2245	5722	4
1942 FED FIRM SURPLUS/DEFICIT	5614	5535	3088	2304	3665	6623	5983	6285	4348	6681	4
1943 FED FIRM SURPLUS/DEFICIT	6523	4597	4708	3968	3785	4874	6016	5714	6129	6079	4
1944 FED FIRM SURPLUS/DEFICIT	6868	3744	4284	3726	4176	4764	1721	1053	1001	3805	3
1945 FED FIRM SURPLUS/DEFICIT	3328	3172	3152	2078	2280	3497	2873	1408	2465	4750	2
1946 FED FIRM SURPLUS/DEFICIT	3060	3109	3156	2090	2428	3188	6049	5707	6165	5796	4
1947 FED FIRM SURPLUS/DEFICIT	6700	4398	4646	3855	3629	6592	6045	5748	6222	6014	4
1948 FED FIRM SURPLUS/DEFICIT	5361	3435	4426	6122	5393	6395	6043	5703	6059	5954	3
1949 FED FIRM SURPLUS/DEFICIT	8268	7728	4693	3748	4011	5062	6021	5900	6403	6351	4
1950 FED FIRM SURPLUS/DEFICIT	3065	3112	3141	2086	2084	4916	6040	5681	6086	5982	4
1951 FED FIRM SURPLUS/DEFICIT	8455	6999	4409	4826	6026	6739	6056	5724	6130	6040	4
1952 FED FIRM SURPLUS/DEFICIT	8528	5020	4015	5670	3684	6279	6017	5836	6305	6267	4
1953 FED FIRM SURPLUS/DEFICIT	5978	3109	4331	3768	4342	5027	6072	5773	5354	5479	4
1954 FED FIRM SURPLUS/DEFICIT	6385	5530	4335	3824	3569	4901	6047	5707	6052	5937	4
1955 FED FIRM SURPLUS/DEFICIT	8665	9122	6691	3738	4213	5893	6027	6110	5537	6535	3
1956 FED FIRM SURPLUS/DEFICIT	7497	3731	4145	2669	4891	6732	6054	5691	6060	5936	3
1957 FED FIRM SURPLUS/DEFICIT	7141	5850	3146	2417	2906	6315	6026	5856	6366	6304	4
1958 FED FIRM SURPLUS/DEFICIT	3296	3109	4238	3793	3961	4701	6046	5888	6406	6080	4
1959 FED FIRM SURPLUS/DEFICIT	3587	3751	4261	3636	3535	5973	6066	5690	6041	5967	4
1960 FED FIRM SURPLUS/DEFICIT	7244	5630	7873	7961	6860	6555	6027	5787	6289	6286	4
1961 FED FIRM SURPLUS/DEFICIT	6499	3159	4430	4103	3321	4834	6027	5718	6114	6047	4
1962 FED FIRM SURPLUS/DEFICIT	3662	4635	4405	3758	3876	4450	6013	6079	6647	6731	4
1963 FED FIRM SURPLUS/DEFICIT	6150	4865	4266	4024	3329	6503	6034	6275	6082	6667	3
1964 FED FIRM SURPLUS/DEFICIT	5800	4691	4740	3704	3589	4718	6051	5740	6168	6088	3
1965 FED FIRM SURPLUS/DEFICIT	7561	5386	4280	4132	4218	6727	6055	5775	6180	6065	4
1966 FED FIRM SURPLUS/DEFICIT	8347	7609	4560	3912	4201	5490	6028	6332	6443	6659	4
1967 FED FIRM SURPLUS/DEFICIT	6634	3819	4362	3663	3943	4477	6050	5694	6098	5993	2
1968 FED FIRM SURPLUS/DEFICIT	8112	5508	4523	3267	3583	5160	6058	5988	6697	5748	3
1969 FED FIRM SURPLUS/DEFICIT	3760	6007	6137	5460	5656	6466	6042	5654	6085	6059	4
1970 FED FIRM SURPLUS/DEFICIT	3921	3096	3153	3139	3433	4507	6017	6541	7165	6891	3
1971 FED FIRM SURPLUS/DEFICIT	3069	3108	3252	2840	3455	4783	6036	5602	6030	5765	4

1972 FED FIRM SURPLUS/DEFICIT	8714	5746	3176	2776	2965	5924	6040	5617	6119	6123	3959
1973 FED FIRM SURPLUS/DEFICIT	8696	8027	3174	3362	3726	5775	5726	4648	2457	2041	2197
1974 FED FIRM SURPLUS/DEFICIT	3064	3107	3159	2085	1621	6570	6056	5968	6152	5910	3863
1975 FED FIRM SURPLUS/DEFICIT	8720	7180	3404	3299	3678	4071	6044	5794	6301	4944	4121
1976 FED FIRM SURPLUS/DEFICIT	4774	5787	3171	3821	5372	6709	6067	5662	6069	6014	4175
1977 FED FIRM SURPLUS/DEFICIT	8684	9216	7632	3771	3973	5071	2827	916	1740	3676	4060
1978 FED FIRM SURPLUS/DEFICIT	3194	3301	3072	1996	2483	4339	5984	5544	6111	5927	4115
***Less PP&L contract**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**
***Less cold weather adjustment**					**-1400**	**-1500**	**-1500**	**-1500**			
***Less SOR 5b reduction**	**-1100**	**-1100**	**-1400**	**-50**	**0**	**-500**	**-750**	**-600**	**-1600**	**-3400**	**-2800**
***Add replacement of firm energy deficit**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**
***Add firm capacity to meet Fed firm energy loads at C-E ratio of .72**	**397**	**397**	**397**	**397**	**397**	**397**	**397**	**397**	**397**	**397**	**397**

1997-98
OPERATING YEAR RUN
DATE: 03/05/93 MEDIUM LOAD FORECAST

PEAK IN MEGAWATTS	**AUG**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**	**JAN**	**FEB**	**MAR**	**APR**	**APR**
ADJUSTED	**1-15**	**16-31**								**1-15**	**16-30**
1929 FED FIRM SURPLUS/DEFICIT	**6398**	**3462**	**3239**	**4200**	**2921**	**3368**	**403**	**27**	**1234**	**-285**	**1386**
1930 FED FIRM SURPLUS/DEFICIT	**3276**	**3318**	**2343**	**2869**	**2479**	**2396**	**121**	**-1152**	**890**	**466**	**1288**
1931 FED FIRM SURPLUS/DEFICIT	**5421**	**4133**	**2310**	**3011**	**2382**	**2899**	**59**	**-1447**	**214**	**2236**	**514**
1932 FED FIRM SURPLUS/DEFICIT	**2460**	**3089**	**2242**	**2516**	**1239**	**1880**	**3098**	**3978**	**4799**	**2998**	**1768**
1933 FED FIRM SURPLUS/DEFICIT	**4936**	**5658**	**3865**	**4238**	**2692**	**3679**	**4365**	**4141**	**5017**	**2936**	**1904**
1934 FED FIRM SURPLUS/DEFICIT	**8073**	**7170**	**3709**	**4611**	**5775**	**5284**	**4383**	**4199**	**5126**	**3266**	**2102**
1935 FED FIRM SURPLUS/DEFICIT	**3861**	**3744**	**3899**	**3932**	**2567**	**3381**	**4319**	**4783**	**3684**	**2131**	**2163**
1936 FED FIRM SURPLUS/DEFICIT	**6861**	**3525**	**3883**	**4365**	**3461**	**3721**	**3964**	**2521**	**4784**	**3284**	**2259**
1937 FED FIRM SURPLUS/DEFICIT	**3568**	**3387**	**3392**	**4479**	**3586**	**3365**	**-107**	**760**	**1162**	**788**	**1556**
1938 FED FIRM SURPLUS/DEFICIT	**2542**	**2755**	**2295**	**2573**	**83**	**2094**	**4357**	**4117**	**5138**	**3107**	**1827**
1939 FED FIRM SURPLUS/DEFICIT	**3065**	**2969**	**3834**	**4539**	**3272**	**3221**	**2634**	**-873**	**5362**	**4108**	**2776**
1940 FED FIRM SURPLUS/DEFICIT	**4558**	**3548**	**3719**	**4664**	**3656**	**3450**	**3116**	**-359**	**5549**	**4921**	**3552**
1941 FED FIRM SURPLUS/DEFICIT	**4191**	**3545**	**2407**	**3132**	**2628**	**2899**	**895**	**1159**	**1242**	**2919**	**2196**
1942 FED FIRM SURPLUS/DEFICIT	**5111**	**5032**	**2285**	**2851**	**2862**	**5220**	**4330**	**4782**	**3345**	**3878**	**2136**
1943 FED FIRM SURPLUS/DEFICIT	**6020**	**4094**	**3905**	**4515**	**2982**	**3471**	**4363**	**4211**	**5126**	**3276**	**2043**
1944 FED FIRM SURPLUS/DEFICIT	**6365**	**3241**	**3481**	**4273**	**3373**	**3361**	**68**	**-450**	**-2**	**1002**	**1661**
1945 FED FIRM SURPLUS/DEFICIT	**2825**	**2669**	**2349**	**2625**	**1477**	**2094**	**1220**	**-95**	**1462**	**1947**	**794**
1946 FED FIRM SURPLUS/DEFICIT	**2557**	**2606**	**2353**	**2637**	**1625**	**1785**	**4396**	**4204**	**5162**	**2993**	**1981**
1947 FED FIRM SURPLUS/DEFICIT	**6197**	**3895**	**3843**	**4402**	**2826**	**5189**	**4392**	**4245**	**5219**	**3211**	**2110**
1948 FED FIRM SURPLUS/DEFICIT	**4858**	**2932**	**3623**	**6669**	**4590**	**4992**	**4390**	**4200**	**5056**	**3151**	**1725**
1949 FED FIRM SURPLUS/DEFICIT	**7765**	**7225**	**3890**	**4295**	**3208**	**3659**	**4368**	**4397**	**5400**	**3548**	**2271**
1950 FED FIRM SURPLUS/DEFICIT	**2562**	**2609**	**2338**	**2633**	**1281**	**3513**	**4387**	**4178**	**5083**	**3179**	**1911**
1951 FED FIRM SURPLUS/DEFICIT	**7952**	**6496**	**3606**	**5373**	**5223**	**5336**	**4403**	**4221**	**5127**	**3237**	**2006**
1952 FED FIRM SURPLUS/DEFICIT	**8025**	**4517**	**3212**	**6217**	**2881**	**4876**	**4364**	**4333**	**5302**	**3464**	**2230**
1953 FED FIRM SURPLUS/DEFICIT	**5475**	**2606**	**3528**	**4315**	**3539**	**3624**	**4419**	**4270**	**4351**	**2676**	**1806**
1954 FED FIRM SURPLUS/DEFICIT	**5882**	**5027**	**3532**	**4371**	**2766**	**3498**	**4394**	**4204**	**5049**	**3134**	**1878**
1955 FED FIRM SURPLUS/DEFICIT	**8162**	**8619**	**5888**	**4285**	**3410**	**4490**	**4374**	**4607**	**4534**	**3732**	**889**
1956 FED FIRM SURPLUS/DEFICIT	**6994**	**3228**	**3342**	**3216**	**4088**	**5329**	**4401**	**4188**	**5057**	**3133**	**1750**
1957 FED FIRM SURPLUS/DEFICIT	**6638**	**5347**	**2343**	**2964**	**2103**	**4912**	**4373**	**4353**	**5363**	**3501**	**2253**

1958 FED FIRM SURPLUS/DEFICIT	**2793**	**2606**	**3435**	**4340**	**3158**	**3298**	**4393**	**4385**	**5403**	**3277**	**2**
1959 FED FIRM SURPLUS/DEFICIT	**3084**	**3248**	**3458**	**4183**	**2732**	**4570**	**4413**	**4187**	**5038**	**3164**	**1**
1960 FED FIRM SURPLUS/DEFICIT	**6741**	**5127**	**7070**	**8508**	**6057**	**5152**	**4374**	**4284**	**5286**	**3483**	**1**
1961 FED FIRM SURPLUS/DEFICIT	**5996**	**2656**	**3627**	**4650**	**2518**	**3431**	**4374**	**4215**	**5111**	**3244**	**2**
1962 FED FIRM SURPLUS/DEFICIT	**3159**	**4132**	**3602**	**4305**	**3073**	**3047**	**4360**	**4576**	**5644**	**3928**	**2**
1963 FED FIRM SURPLUS/DEFICIT	**5647**	**4362**	**3463**	**4571**	**2526**	**5100**	**4381**	**4772**	**5079**	**3864**	**1**
1964 FED FIRM SURPLUS/DEFICIT	**5297**	**4188**	**3937**	**4251**	**2786**	**3315**	**4398**	**4237**	**5165**	**3285**	**1**
1965 FED FIRM SURPLUS/DEFICIT	**7058**	**4883**	**3477**	**4679**	**3415**	**5324**	**4402**	**4272**	**5177**	**3262**	**2**
1966 FED FIRM SURPLUS/DEFICIT	**7844**	**7106**	**3757**	**4459**	**3398**	**4087**	**4375**	**4829**	**5440**	**3856**	**2**
1967 FED FIRM SURPLUS/DEFICIT	**6131**	**3316**	**3559**	**4210**	**3140**	**3074**	**4397**	**4191**	**5095**	**3190**	
1968 FED FIRM SURPLUS/DEFICIT	**7609**	**5005**	**3720**	**3814**	**2780**	**3757**	**4405**	**4485**	**5694**	**2945**	
1969 FED FIRM SURPLUS/DEFICIT	**3257**	**5504**	**5334**	**6007**	**4853**	**5063**	**4389**	**4151**	**5082**	**3256**	**2**
1970 FED FIRM SURPLUS/DEFICIT	**3418**	**2593**	**2350**	**3686**	**2630**	**3104**	**4364**	**5038**	**6162**	**4088**	**1**
1971 FED FIRM SURPLUS/DEFICIT	**2566**	**2605**	**2449**	**3387**	**2652**	**3380**	**4383**	**4099**	**5027**	**2962**	**1**
1972 FED FIRM SURPLUS/DEFICIT	**8211**	**5243**	**2373**	**3323**	**2162**	**4521**	**4387**	**4114**	**5116**	**3320**	**1**
1973 FED FIRM SURPLUS/DEFICIT	**8193**	**7524**	**2371**	**3909**	**2923**	**4372**	**4073**	**3145**	**1454**	**-762**	
1974 FED FIRM SURPLUS/DEFICIT	**2561**	**2604**	**2356**	**2632**	**818**	**5167**	**4403**	**4465**	**5149**	**3107**	**1**
1975 FED FIRM SURPLUS/DEFICIT	**8217**	**6677**	**2601**	**3846**	**2875**	**2668**	**4391**	**4291**	**5298**	**2141**	**1**
1976 FED FIRM SURPLUS/DEFICIT	**4271**	**5284**	**2368**	**4368**	**4569**	**5306**	**4414**	**4159**	**5066**	**3211**	**1**
1977 FED FIRM SURPLUS/DEFICIT	**8181**	**8713**	**6829**	**4318**	**3170**	**3668**	**1174**	**-587**	**737**	**873**	**1**
1978 FED FIRM SURPLUS/DEFICIT	**2691**	**2798**	**2269**	**2543**	**1680**	**2936**	**4331**	**4041**	**5108**	**3124**	**1**

1998-99
OPERATING YEAR
RUN DATE: 03/05/93 MEDIUM LOAD FORECAST

PEAK IN MEGAWATTS	AUG	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	A
UNADJUSTED	1-15	16-31								1-15	16
1929 FED FIRM SURPLUS/DEFICIT	7047	4112	4187	3782	3558	4601	1874	1348	2068	2171	3
1930 FED FIRM SURPLUS/DEFICIT	3926	3968	3292	2450	3116	3629	1592	169	1725	2922	3
1931 FED FIRM SURPLUS/DEFICIT	6070	4783	3259	2593	3019	4131	1530	-126	1048	4693	2
1932 FED FIRM SURPLUS/DEFICIT	3110	3739	3191	2097	1876	3113	4568	5299	5633	5454	3
1933 FED FIRM SURPLUS/DEFICIT	5586	6308	4813	3819	3329	4912	5835	5462	5851	5393	3
1934 FED FIRM SURPLUS/DEFICIT	8723	7820	4657	4192	6412	6516	5853	5520	5960	5722	3
1935 FED FIRM SURPLUS/DEFICIT	4510	4394	4848	3513	3204	4614	5789	6104	4518	4587	4
1936 FED FIRM SURPLUS/DEFICIT	7510	4175	4831	3946	4097	4954	5434	3842	5618	5740	4
1937 FED FIRM SURPLUS/DEFICIT	4217	4038	4340	4060	4222	4597	1364	2081	1996	3244	3
1938 FED FIRM SURPLUS/DEFICIT	3192	3405	3244	2154	719	3326	5828	5438	5972	5564	3
1939 FED FIRM SURPLUS/DEFICIT	3715	3620	4782	4121	3909	4454	4105	448	6196	6564	4
1940 FED FIRM SURPLUS/DEFICIT	5208	4198	4667	4245	4292	4683	4586	962	6384	7378	5
1941 FED FIRM SURPLUS/DEFICIT	4840	4195	3355	2713	3264	4131	2365	2480	2076	5376	4
1942 FED FIRM SURPLUS/DEFICIT	5760	5682	3234	2432	3499	6453	5801	6103	4179	6334	4
1943 FED FIRM SURPLUS/DEFICIT	6670	4744	4854	4096	3619	4704	5833	5532	5960	5732	3
1944 FED FIRM SURPLUS/DEFICIT	7014	3891	4429	3854	4009	4594	1538	871	833	3458	3
1945 FED FIRM SURPLUS/DEFICIT	3475	3319	3298	2206	2114	3327	2691	1226	2296	4404	2
1946 FED FIRM SURPLUS/DEFICIT	3207	3256	3302	2218	2261	3018	5867	5525	5996	5450	3
1947 FED FIRM SURPLUS/DEFICIT	6847	4546	4791	3983	3463	6422	5862	5566	6053	5667	3
1948 FED FIRM SURPLUS/DEFICIT	5507	3582	4571	6250	5226	6225	5860	5521	5890	5608	3
1949 FED FIRM SURPLUS/DEFICIT	8415	7875	4838	3876	3845	4891	5838	5718	6234	6004	4

1950 FED FIRM SURPLUS/DEFICIT	3212	3259	3287	2214	1918	4745	5857	5499	5917	5635	3799
1951 FED FIRM SURPLUS/DEFICIT	8602	7146	4554	4955	5860	6568	5873	5542	5961	5694	3894
1952 FED FIRM SURPLUS/DEFICIT	8675	5168	4160	5799	3518	6108	5834	5654	6136	5920	4118
1953 FED FIRM SURPLUS/DEFICIT	6124	3256	4476	3896	4176	4857	5889	5591	5185	5132	3695
1954 FED FIRM SURPLUS/DEFICIT	6531	5677	4480	3953	3403	4730	5864	5525	5883	5590	3766
1955 FED FIRM SURPLUS/DEFICIT	8812	9269	6836	3866	4046	5722	5845	5928	5368	6189	2777
1956 FED FIRM SURPLUS/DEFICIT	7644	3878	4291	2797	4725	6561	5871	5509	5891	5590	3638
1957 FED FIRM SURPLUS/DEFICIT	7288	5997	3291	2545	2740	6145	5843	5674	6197	5957	4142
1958 FED FIRM SURPLUS/DEFICIT	3442	3256	4383	3921	3795	4531	5863	5706	6237	5733	3893
1959 FED FIRM SURPLUS/DEFICIT	3733	3898	4406	3764	3369	5802	5883	5508	5872	5620	3838
1960 FED FIRM SURPLUS/DEFICIT	7390	5778	8018	8090	6694	6385	5844	5604	6120	5939	3824
1961 FED FIRM SURPLUS/DEFICIT	6646	3306	4576	4231	3155	4664	5845	5536	5946	5700	3902
1962 FED FIRM SURPLUS/DEFICIT	3809	4782	4550	3886	3709	4280	5830	5897	6478	6384	4249
1963 FED FIRM SURPLUS/DEFICIT	6297	5012	4412	4153	3163	6333	5851	6093	5913	6320	3008
1964 FED FIRM SURPLUS/DEFICIT	5946	4839	4885	3832	3423	4548	5869	5558	5998	5741	3105
1965 FED FIRM SURPLUS/DEFICIT	7707	5533	4425	4261	4052	6556	5872	5593	6011	5718	3917
1966 FED FIRM SURPLUS/DEFICIT	8493	7756	4706	4040	4034	5319	5846	6148	6274	6312	3910
1967 FED FIRM SURPLUS/DEFICIT	6780	3966	4507	3791	3777	4307	5867	5512	5929	5647	2537
1968 FED FIRM SURPLUS/DEFICIT	8258	5655	4668	3396	3416	4990	5875	5806	6528	5401	2694
1969 FED FIRM SURPLUS/DEFICIT	3906	6154	6282	5588	5490	6296	5859	5472	5916	5712	3958
1970 FED FIRM SURPLUS/DEFICIT	4068	3243	3298	3267	3267	4337	5834	6359	6996	6544	3200
1971 FED FIRM SURPLUS/DEFICIT	3216	3255	3397	2968	3288	4613	5854	5420	5862	5418	3696
1972 FED FIRM SURPLUS/DEFICIT	8861	5893	3321	2905	2799	5754	5857	5435	5950	5776	3645
1973 FED FIRM SURPLUS/DEFICIT	8843	8175	3319	3490	3560	5604	5543	4466	2289	1695	1882
1974 FED FIRM SURPLUS/DEFICIT	3211	3254	3305	2213	1455	6400	5874	5786	5983	5563	3549
1975 FED FIRM SURPLUS/DEFICIT	8866	7327	3550	3428	3511	3900	5861	5612	6132	4597	3807
1976 FED FIRM SURPLUS/DEFICIT	4920	5934	3316	3950	5206	6538	5884	5480	5900	5668	3860
1977 FED FIRM SURPLUS/DEFICIT	8831	9363	7777	3899	3806	4900	2645	734	1572	3329	3745
1978 FED FIRM SURPLUS/DEFICIT	3340	3448	3218	2124	2316	4169	5801	5362	5942	5581	3801
***Less PP&L contract**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**
***Less cold weather adjustment**					**-1400**	**-1500**	**-1500**	**-1500**			
***Less SOR 5b reduction**	**-1100**	**-1100**	**-1400**	**-50**	**0**	**-500**	**-750**	**-600**	**-1600**	**-3400**	**-2800**
***Add replacement of firm energy deficit**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**
***Add firm capacity to meet Fed firm energy loads at C-E ratio of .75**	**481**	**481**	**481**	**481**	**481**	**481**	**481**	**481**	**481**	**481**	**481**

1998-99
OPERATING YEAR RUN
DATE: 03/05/93 MEDIUM LOAD FORECAST

PEAK IN MEGAWATTS	**AUG**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**	**JAN**	**FEB**	**MAR**	**APR**	**APR**
ADJUSTED	**1-15**	**16-31**								**1-15**	**16-30**
1929 FED FIRM SURPLUS/DEFICIT	**6628**	**3693**	**3468**	**4413**	**2839**	**3282**	**305**	**-71**	**1149**	**-548**	**1155**
1930 FED FIRM SURPLUS/DEFICIT	**3507**	**3549**	**2573**	**3081**	**2397**	**2310**	**23**	**-1250**	**806**	**203**	**1057**
1931 FED FIRM SURPLUS/DEFICIT	**5651**	**4364**	**2540**	**3224**	**2300**	**2812**	**-39**	**-1545**	**129**	**1974**	**283**
1932 FED FIRM SURPLUS/DEFICIT	**2691**	**3320**	**2472**	**2728**	**1157**	**1794**	**2999**	**3880**	**4714**	**2735**	**1538**
1933 FED FIRM SURPLUS/DEFICIT	**5167**	**5889**	**4094**	**4450**	**2610**	**3593**	**4266**	**4043**	**4932**	**2674**	**1673**
1934 FED FIRM SURPLUS/DEFICIT	**8304**	**7401**	**3938**	**4823**	**5693**	**5197**	**4284**	**4101**	**5041**	**3003**	**1872**
1935 FED FIRM SURPLUS/DEFICIT	**4091**	**3975**	**4129**	**4144**	**2485**	**3295**	**4220**	**4685**	**3599**	**1868**	**1932**
1936 FED FIRM SURPLUS/DEFICIT	**7091**	**3756**	**4112**	**4577**	**3378**	**3635**	**3865**	**2423**	**4699**	**3021**	**2029**

1937 FED FIRM SURPLUS/DEFICIT	**3798**	**3619**	**3621**	**4691**	**3503**	**3278**	**-205**	**662**	**1077**	**525**	1
1938 FED FIRM SURPLUS/DEFICIT	**2773**	**2986**	**2525**	**2785**	**0**	**2007**	**4259**	**4019**	**5053**	**2845**	1
1939 FED FIRM SURPLUS/DEFICIT	**3296**	**3201**	**4063**	**4752**	**3190**	**3135**	**2536**	**-971**	**5277**	**3845**	2
1940 FED FIRM SURPLUS/DEFICIT	**4789**	**3779**	**3948**	**4876**	**3573**	**3364**	**3017**	**-457**	**5465**	**4659**	3
1941 FED FIRM SURPLUS/DEFICIT	**4421**	**3776**	**2636**	**3344**	**2545**	**2812**	**796**	**1061**	**1157**	**2657**	1
1942 FED FIRM SURPLUS/DEFICIT	**5341**	**5263**	**2515**	**3063**	**2780**	**5134**	**4232**	**4684**	**3260**	**3615**	1
1943 FED FIRM SURPLUS/DEFICIT	**6251**	**4325**	**4135**	**4727**	**2900**	**3385**	**4264**	**4113**	**5041**	**3013**	1
1944 FED FIRM SURPLUS/DEFICIT	**6595**	**3472**	**3710**	**4485**	**3290**	**3275**	**-31**	**-548**	**-86**	**739**	1
1945 FED FIRM SURPLUS/DEFICIT	**3056**	**2900**	**2579**	**2837**	**1395**	**2008**	**1122**	**-193**	**1377**	**1685**	
1946 FED FIRM SURPLUS/DEFICIT	**2788**	**2837**	**2583**	**2849**	**1542**	**1699**	**4298**	**4106**	**5077**	**2731**	1
1947 FED FIRM SURPLUS/DEFICIT	**6428**	**4127**	**4072**	**4614**	**2744**	**5103**	**4293**	**4147**	**5134**	**2948**	1
1948 FED FIRM SURPLUS/DEFICIT	**5088**	**3163**	**3852**	**6881**	**4507**	**4906**	**4291**	**4102**	**4971**	**2889**	1
1949 FED FIRM SURPLUS/DEFICIT	**7996**	**7456**	**4119**	**4507**	**3126**	**3572**	**4269**	**4299**	**5315**	**3285**	2
1950 FED FIRM SURPLUS/DEFICIT	**2793**	**2840**	**2568**	**2845**	**1199**	**3426**	**4288**	**4080**	**4998**	**2916**	1
1951 FED FIRM SURPLUS/DEFICIT	**8183**	**6727**	**3835**	**5586**	**5141**	**5249**	**4304**	**4123**	**5042**	**2975**	1
1952 FED FIRM SURPLUS/DEFICIT	**8256**	**4749**	**3441**	**6430**	**2799**	**4789**	**4265**	**4235**	**5217**	**3201**	1
1953 FED FIRM SURPLUS/DEFICIT	**5705**	**2837**	**3757**	**4527**	**3457**	**3538**	**4320**	**4172**	**4266**	**2413**	1
1954 FED FIRM SURPLUS/DEFICIT	**6112**	**5258**	**3761**	**4584**	**2684**	**3411**	**4295**	**4106**	**4964**	**2871**	1
1955 FED FIRM SURPLUS/DEFICIT	**8393**	**8850**	**6117**	**4497**	**3327**	**4403**	**4276**	**4509**	**4449**	**3470**	
1956 FED FIRM SURPLUS/DEFICIT	**7225**	**3459**	**3572**	**3428**	**4006**	**5242**	**4302**	**4090**	**4972**	**2871**	1
1957 FED FIRM SURPLUS/DEFICIT	**6869**	**5578**	**2572**	**3176**	**2021**	**4826**	**4274**	**4255**	**5278**	**3238**	2
1958 FED FIRM SURPLUS/DEFICIT	**3023**	**2837**	**3664**	**4552**	**3076**	**3212**	**4294**	**4287**	**5318**	**3014**	1
1959 FED FIRM SURPLUS/DEFICIT	**3314**	**3479**	**3687**	**4395**	**2650**	**4483**	**4314**	**4089**	**4953**	**2901**	1
1960 FED FIRM SURPLUS/DEFICIT	**6971**	**5359**	**7299**	**8721**	**5975**	**5066**	**4275**	**4185**	**5201**	**3220**	1
1961 FED FIRM SURPLUS/DEFICIT	**6227**	**2887**	**3857**	**4862**	**2436**	**3345**	**4276**	**4117**	**5027**	**2981**	1
1962 FED FIRM SURPLUS/DEFICIT	**3390**	**4363**	**3831**	**4517**	**2990**	**2961**	**4261**	**4478**	**5559**	**3665**	2
1963 FED FIRM SURPLUS/DEFICIT	**5878**	**4593**	**3693**	**4784**	**2444**	**5014**	**4282**	**4674**	**4994**	**3601**	
1964 FED FIRM SURPLUS/DEFICIT	**5527**	**4420**	**4166**	**4463**	**2704**	**3229**	**4300**	**4139**	**5079**	**3022**	
1965 FED FIRM SURPLUS/DEFICIT	**7288**	**5114**	**3706**	**4892**	**3333**	**5237**	**4303**	**4174**	**5092**	**2999**	1
1966 FED FIRM SURPLUS/DEFICIT	**8074**	**7337**	**3987**	**4671**	**3315**	**4000**	**4277**	**4729**	**5355**	**3593**	1
1967 FED FIRM SURPLUS/DEFICIT	**6361**	**3547**	**3788**	**4422**	**3058**	**2988**	**4298**	**4093**	**5010**	**2928**	
1968 FED FIRM SURPLUS/DEFICIT	**7839**	**5236**	**3949**	**4027**	**2697**	**3671**	**4306**	**4387**	**5609**	**2682**	
1969 FED FIRM SURPLUS/DEFICIT	**3487**	**5735**	**5563**	**6219**	**4771**	**4977**	**4290**	**4053**	**4997**	**2993**	1
1970 FED FIRM SURPLUS/DEFICIT	**3649**	**2824**	**2579**	**3898**	**2548**	**3018**	**4265**	**4940**	**6077**	**3825**	1
1971 FED FIRM SURPLUS/DEFICIT	**2797**	**2836**	**2678**	**3599**	**2569**	**3294**	**4285**	**4001**	**4943**	**2699**	1
1972 FED FIRM SURPLUS/DEFICIT	**8442**	**5474**	**2602**	**3536**	**2080**	**4435**	**4288**	**4016**	**5031**	**3057**	1
1973 FED FIRM SURPLUS/DEFICIT	**8424**	**7756**	**2600**	**4121**	**2841**	**4285**	**3974**	**3047**	**1370**	**-1024**	
1974 FED FIRM SURPLUS/DEFICIT	**2792**	**2835**	**2586**	**2844**	**736**	**5081**	**4305**	**4367**	**5064**	**2844**	1
1975 FED FIRM SURPLUS/DEFICIT	**8447**	**6908**	**2831**	**4059**	**2792**	**2581**	**4292**	**4193**	**5213**	**1878**	1
1976 FED FIRM SURPLUS/DEFICIT	**4501**	**5515**	**2597**	**4581**	**4487**	**5219**	**4315**	**4061**	**4981**	**2949**	1
1977 FED FIRM SURPLUS/DEFICIT	**8412**	**8944**	**7058**	**4530**	**3087**	**3581**	**1076**	**-685**	**653**	**610**	1
1978 FED FIRM SURPLUS/DEFICIT	**2921**	**3029**	**2499**	**2755**	**1597**	**2850**	**4232**	**3943**	**5023**	**2862**	1

1999- 0

OPERATING YEAR
RUN DATE: 03/05/93 MEDIUM LOAD FORECAST

PEAK IN MEGAWATTS	AUG	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	A
UNADJUSTED	1-15	16-31								1-15	16
1929 FED FIRM SURPLUS/DEFICIT	6873	3937	4006	3612	3310	4374	1642	1099	1846	2196	3

1930 FED FIRM SURPLUS/DEFICIT	3751	3792	3110	2281	2868	3402	1360	-80	1502	2947	3202
1931 FED FIRM SURPLUS/DEFICIT	5895	4607	3077	2423	2771	3904	1298	-375	825	4718	2427
1932 FED FIRM SURPLUS/DEFICIT	2935	3564	3009	1927	1628	2886	4337	5049	5410	5478	3682
1933 FED FIRM SURPLUS/DEFICIT	5411	6132	4631	3649	3081	4685	5604	5213	5629	5418	3818
1934 FED FIRM SURPLUS/DEFICIT	8548	7644	4475	4022	6164	6289	5622	5271	5737	5747	4016
1935 FED FIRM SURPLUS/DEFICIT	4335	4218	4666	3344	2956	4387	5558	5855	4295	4612	4076
1936 FED FIRM SURPLUS/DEFICIT	7335	3999	4649	3776	3849	4727	5203	3593	5395	5765	4173
1937 FED FIRM SURPLUS/DEFICIT	4042	3862	4158	3890	3975	4371	1132	1832	1773	3269	3469
1938 FED FIRM SURPLUS/DEFICIT	3017	3230	3062	1984	471	3099	5596	5189	5749	5589	3741
1939 FED FIRM SURPLUS/DEFICIT	3540	3444	4600	3951	3661	4227	3873	199	5973	6589	4689
1940 FED FIRM SURPLUS/DEFICIT	5033	4023	4485	4075	4045	4456	4355	713	6161	7403	5466
1941 FED FIRM SURPLUS/DEFICIT	4665	4019	3173	2543	3017	3905	2134	2231	1853	5400	4110
1942 FED FIRM SURPLUS/DEFICIT	5586	5507	3052	2262	3251	6226	5569	5854	3956	6359	4050
1943 FED FIRM SURPLUS/DEFICIT	6495	4569	4672	3926	3371	4477	5602	5283	5737	5757	3957
1944 FED FIRM SURPLUS/DEFICIT	6840	3716	4247	3685	3762	4367	1307	622	610	3483	3575
1945 FED FIRM SURPLUS/DEFICIT	3300	3143	3116	2036	1866	3100	2459	977	2073	4429	2708
1946 FED FIRM SURPLUS/DEFICIT	3032	3081	3120	2048	2014	2791	5635	5276	5774	5475	3895
1947 FED FIRM SURPLUS/DEFICIT	6672	4370	4609	3814	3215	6195	5631	5317	5830	5692	4024
1948 FED FIRM SURPLUS/DEFICIT	5332	3407	4389	6080	4978	5998	5629	5272	5667	5633	3638
1949 FED FIRM SURPLUS/DEFICIT	8240	7699	4656	3706	3597	4664	5607	5469	6012	6029	4185
1950 FED FIRM SURPLUS/DEFICIT	3037	3084	3105	2044	1670	4518	5626	5250	5694	5660	3825
1951 FED FIRM SURPLUS/DEFICIT	8427	6971	4372	4785	5612	6341	5642	5293	5738	5719	3919
1952 FED FIRM SURPLUS/DEFICIT	8500	4992	3978	5629	3270	5881	5603	5405	5914	5945	4144
1953 FED FIRM SURPLUS/DEFICIT	5950	3081	4295	3726	3928	4630	5658	5342	4962	5157	3720
1954 FED FIRM SURPLUS/DEFICIT	6357	5502	4298	3783	3155	4503	5633	5276	5661	5615	3792
1955 FED FIRM SURPLUS/DEFICIT	8637	9094	6655	3696	3798	5495	5613	5679	5146	6214	2803
1956 FED FIRM SURPLUS/DEFICIT	7469	3702	4109	2627	4477	6334	5640	5260	5668	5615	3663
1957 FED FIRM SURPLUS/DEFICIT	7113	5822	3110	2376	2492	5918	5612	5425	5974	5982	4167
1958 FED FIRM SURPLUS/DEFICIT	3267	3081	4201	3751	3547	4304	5632	5457	6014	5758	3918
1959 FED FIRM SURPLUS/DEFICIT	3558	3722	4224	3594	3121	5575	5652	5259	5650	5645	3863
1960 FED FIRM SURPLUS/DEFICIT	7216	5602	7836	7920	6446	6158	5613	5355	5897	5964	3849
1961 FED FIRM SURPLUS/DEFICIT	6471	3131	4394	4062	2907	4437	5613	5286	5723	5725	3927
1962 FED FIRM SURPLUS/DEFICIT	3634	4606	4368	3717	3461	4053	5599	5648	6255	6409	4274
1963 FED FIRM SURPLUS/DEFICIT	6122	4837	4230	3983	2915	6106	5620	5844	5690	6345	3033
1964 FED FIRM SURPLUS/DEFICIT	5771	4663	4703	3663	3175	4321	5637	5309	5777	5766	3130
1965 FED FIRM SURPLUS/DEFICIT	7533	5358	4243	4091	3804	6330	5641	5344	5788	5743	3942
1966 FED FIRM SURPLUS/DEFICIT	8319	7581	4524	3871	3787	5092	5614	5899	6051	6337	3935
1967 FED FIRM SURPLUS/DEFICIT	6605	3790	4325	3621	3529	4080	5636	5263	5706	5672	2563
1968 FED FIRM SURPLUS/DEFICIT	8083	5480	4486	3226	3168	4763	5644	5557	6305	5426	2719
1969 FED FIRM SURPLUS/DEFICIT	3731	5979	6100	5418	5242	6069	5628	5223	5693	5738	3984
1970 FED FIRM SURPLUS/DEFICIT	3893	3068	3116	3097	3019	4110	5603	6110	6773	6569	3225
1971 FED FIRM SURPLUS/DEFICIT	3041	3080	3215	2798	3040	4386	5622	5171	5639	5443	3722
1972 FED FIRM SURPLUS/DEFICIT	8686	5717	3139	2735	2551	5527	5626	5186	5727	5801	3670
1973 FED FIRM SURPLUS/DEFICIT	8668	7999	3137	3320	3312	5377	5312	4217	2066	1720	1907
1974 FED FIRM SURPLUS/DEFICIT	3036	3079	3123	2043	1207	6173	5642	5537	5760	5588	3574
1975 FED FIRM SURPLUS/DEFICIT	8692	7152	3368	3258	3264	3673	5630	5363	5909	4622	3832
1976 FED FIRM SURPLUS/DEFICIT	4745	5758	3134	3780	4958	6311	5653	5231	5677	5693	3885
1977 FED FIRM SURPLUS/DEFICIT	8656	9187	7595	3729	3559	4673	2413	485	1349	3354	3770
1978 FED FIRM SURPLUS/DEFICIT	3165	3273	3036	1954	2068	3942	5570	5113	5720	5606	3826

*Less PP&L contract	-1100	-1100	-1100	-1100	-1100	-1100	-1100	-1100	-1100	-1100	-1
*Less cold weather adjustment					-1400	-1500	-1500	-1500			
*Less SOR 5b reduction	-1100	-1100	-1400	-50	0	-500	-750	-600	-1600	-3400	-2
*Add replacement of firm energy deficit	1300	1300	1300	1300	1300	1300	1300	1300	1300	1300	1
*Add firm capacity to meet Fed firm energy loads at C-E ratio of .81	610	610	610	610	610	610	610	610	610	610	
1999- 0											
OPERATING YEAR RUN											
DATE: 03/05/93 MEDIUM LOAD FORECAST											
PEAK IN MEGAWATTS	AUG	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	
ADJUSTED	1-15	16-31								1-15	1
1929 FED FIRM SURPLUS/DEFICIT	7683	4747	4816	4422	2720	3684	952	409	2656	3006	4
1930 FED FIRM SURPLUS/DEFICIT	4561	4602	3920	3091	2278	2712	670	-770	2312	3757	4
1931 FED FIRM SURPLUS/DEFICIT	6705	5417	3887	3233	2181	3214	608	-1065	1635	5528	3
1932 FED FIRM SURPLUS/DEFICIT	3745	4374	3819	2737	1038	2196	3647	4359	6220	6288	4
1933 FED FIRM SURPLUS/DEFICIT	6221	6942	5441	4459	2491	3995	4914	4523	6439	6228	4
1934 FED FIRM SURPLUS/DEFICIT	9358	8454	5285	4832	5574	5599	4932	4581	6547	6557	4
1935 FED FIRM SURPLUS/DEFICIT	5145	5028	5476	4154	2366	3697	4868	5165	5105	5422	4
1936 FED FIRM SURPLUS/DEFICIT	8145	4809	5459	4586	3259	4037	4513	2903	6205	6575	4
1937 FED FIRM SURPLUS/DEFICIT	4852	4672	4968	4700	3385	3681	442	1142	2583	4079	4
1938 FED FIRM SURPLUS/DEFICIT	3827	4040	3872	2794	-119	2409	4906	4499	6559	6399	4
1939 FED FIRM SURPLUS/DEFICIT	4350	4254	5410	4761	3071	3537	3183	-491	6783	7399	5
1940 FED FIRM SURPLUS/DEFICIT	5843	4833	5295	4885	3455	3766	3665	23	6971	8213	6
1941 FED FIRM SURPLUS/DEFICIT	5475	4829	3983	3353	2427	3215	1444	1541	2663	6210	4
1942 FED FIRM SURPLUS/DEFICIT	6396	6317	3862	3072	2661	5536	4879	5164	4766	7169	4
1943 FED FIRM SURPLUS/DEFICIT	7305	5379	5482	4736	2781	3787	4912	4593	6547	6567	4
1944 FED FIRM SURPLUS/DEFICIT	7650	4526	5057	4495	3172	3677	617	-68	1420	4293	4
1945 FED FIRM SURPLUS/DEFICIT	4110	3953	3926	2846	1276	2410	1769	287	2883	5239	3
1946 FED FIRM SURPLUS/DEFICIT	3842	3891	3930	2858	1424	2101	4945	4586	6584	6285	4
1947 FED FIRM SURPLUS/DEFICIT	7482	5180	5419	4624	2625	5505	4941	4627	6640	6502	4
1948 FED FIRM SURPLUS/DEFICIT	6142	4217	5199	6890	4388	5308	4939	4582	6477	6443	4
1949 FED FIRM SURPLUS/DEFICIT	9050	8509	5466	4516	3007	3974	4917	4779	6822	6839	4
1950 FED FIRM SURPLUS/DEFICIT	3847	3894	3915	2854	1080	3828	4936	4560	6504	6470	4
1951 FED FIRM SURPLUS/DEFICIT	9237	7781	5182	5595	5022	5651	4952	4603	6548	6529	4
1952 FED FIRM SURPLUS/DEFICIT	9310	5802	4788	6439	2680	5191	4913	4715	6724	6755	4
1953 FED FIRM SURPLUS/DEFICIT	6760	3891	5105	4536	3338	3940	4968	4652	5772	5967	4
1954 FED FIRM SURPLUS/DEFICIT	7167	6312	5108	4593	2565	3813	4943	4586	6471	6425	4
1955 FED FIRM SURPLUS/DEFICIT	9447	9904	7465	4506	3208	4805	4923	4989	5956	7024	3
1956 FED FIRM SURPLUS/DEFICIT	8279	4512	4919	3437	3887	5644	4950	4570	6478	6425	4
1957 FED FIRM SURPLUS/DEFICIT	7923	6632	3920	3186	1902	5228	4922	4735	6784	6792	4
1958 FED FIRM SURPLUS/DEFICIT	4077	3891	5011	4561	2957	3614	4942	4767	6824	6568	4
1959 FED FIRM SURPLUS/DEFICIT	4368	4532	5034	4404	2531	4885	4962	4569	6460	6455	4
1960 FED FIRM SURPLUS/DEFICIT	8026	6412	8646	8730	5856	5468	4923	4665	6707	6774	4
1961 FED FIRM SURPLUS/DEFICIT	7281	3941	5204	4872	2317	3747	4923	4596	6533	6535	4
1962 FED FIRM SURPLUS/DEFICIT	4444	5416	5178	4527	2871	3363	4909	4958	7065	7219	5
1963 FED FIRM SURPLUS/DEFICIT	6932	5647	5040	4793	2325	5416	4930	5154	6500	7155	3
1964 FED FIRM SURPLUS/DEFICIT	6581	5473	5513	4473	2585	3631	4947	4619	6587	6576	3

1965 FED FIRM SURPLUS/DEFICIT	**8343**	**6168**	**5053**	**4901**	**3214**	**5640**	**4951**	**4654**	**6598**	**6553**	**4752**
1966 FED FIRM SURPLUS/DEFICIT	**9129**	**8391**	**5334**	**4681**	**3197**	**4402**	**4924**	**5209**	**6861**	**7147**	**4745**
1967 FED FIRM SURPLUS/DEFICIT	**7415**	**4600**	**5135**	**4431**	**2939**	**3390**	**4946**	**4573**	**6516**	**6482**	**3373**
1968 FED FIRM SURPLUS/DEFICIT	**8893**	**6290**	**5296**	**4036**	**2578**	**4073**	**4954**	**4867**	**7115**	**6236**	**3529**
1969 FED FIRM SURPLUS/DEFICIT	**4541**	**6789**	**6910**	**6228**	**4652**	**5379**	**4938**	**4533**	**6503**	**6548**	**4794**
1970 FED FIRM SURPLUS/DEFICIT	**4703**	**3878**	**3926**	**3907**	**2429**	**3420**	**4913**	**5420**	**7583**	**7379**	**4035**
1971 FED FIRM SURPLUS/DEFICIT	**3851**	**3890**	**4025**	**3608**	**2450**	**3696**	**4932**	**4481**	**6449**	**6253**	**4532**
1972 FED FIRM SURPLUS/DEFICIT	**9496**	**6527**	**3949**	**3545**	**1961**	**4837**	**4936**	**4496**	**6537**	**6611**	**4480**
1973 FED FIRM SURPLUS/DEFICIT	**9478**	**8809**	**3947**	**4130**	**2722**	**4687**	**4622**	**3527**	**2876**	**2530**	**2717**
1974 FED FIRM SURPLUS/DEFICIT	**3846**	**3889**	**3933**	**2853**	**617**	**5483**	**4952**	**4847**	**6570**	**6398**	**4384**
1975 FED FIRM SURPLUS/DEFICIT	**9502**	**7962**	**4178**	**4068**	**2674**	**2983**	**4940**	**4673**	**6719**	**5432**	**4642**
1976 FED FIRM SURPLUS/DEFICIT	**5555**	**6568**	**3944**	**4590**	**4368**	**5621**	**4963**	**4541**	**6487**	**6503**	**4695**
1977 FED FIRM SURPLUS/DEFICIT	**9466**	**9997**	**8405**	**4539**	**2969**	**3983**	**1723**	**-205**	**2159**	**4164**	**4580**
1978 FED FIRM SURPLUS/DEFICIT	**3975**	**4083**	**3846**	**2764**	**1478**	**3252**	**4880**	**4423**	**6530**	**6416**	**4636**

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FORECAST

PEAK IN MEGAWATTS	AUG	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	APR
UNADJUSTED	1-15	16-31								1-15	16-30
1929 FED FIRM SURPLUS/DEFICIT	6814	3879	3941	3525	3187	4241	1531	989	1758	2110	3214
1930 FED FIRM SURPLUS/DEFICIT	3692	3735	3045	2193	2745	3269	1249	-190	1414	2861	3116
1931 FED FIRM SURPLUS/DEFICIT	5837	4550	3012	2336	2648	3772	1187	-485	738	4632	2342
1932 FED FIRM SURPLUS/DEFICIT	2877	3506	2944	1840	1505	2753	4225	4939	5323	5393	3596
1933 FED FIRM SURPLUS/DEFICIT	5353	6075	4566	3562	2958	4552	5493	5103	5541	5332	3732
1934 FED FIRM SURPLUS/DEFICIT	8489	7587	4410	3935	6041	6157	5511	5160	5649	5661	3930
1935 FED FIRM SURPLUS/DEFICIT	4277	4161	4601	3256	2833	4254	5447	5745	4207	4526	3991
1936 FED FIRM SURPLUS/DEFICIT	7277	3942	4585	3689	3726	4594	5092	3482	5308	5679	4087
1937 FED FIRM SURPLUS/DEFICIT	3984	3804	4094	3803	3852	4238	1021	1721	1685	3183	3383
1938 FED FIRM SURPLUS/DEFICIT	2959	3172	2997	1897	348	2967	5485	5079	5662	5503	3655
1939 FED FIRM SURPLUS/DEFICIT	3482	3386	4536	3864	3538	4095	3762	89	5885	6503	4604
1940 FED FIRM SURPLUS/DEFICIT	4975	3965	4420	3988	3922	4323	4243	603	6073	7317	5380
1941 FED FIRM SURPLUS/DEFICIT	4607	3962	3108	2456	2894	3772	2023	2121	1765	5315	4024
1942 FED FIRM SURPLUS/DEFICIT	5527	5449	2987	2175	3128	6094	5458	5744	3868	6273	3964
1943 FED FIRM SURPLUS/DEFICIT	6436	4511	4607	3839	3248	4345	5491	5173	5649	5671	3871
1944 FED FIRM SURPLUS/DEFICIT	6781	3658	4182	3597	3639	4235	1196	511	522	3397	3489
1945 FED FIRM SURPLUS/DEFICIT	3241	3086	3051	1949	1743	2968	2348	866	1986	4343	2622
1946 FED FIRM SURPLUS/DEFICIT	2974	3023	3055	1961	1891	2659	5524	5166	5686	5389	3809
1947 FED FIRM SURPLUS/DEFICIT	6613	4312	4544	3726	3092	6063	5520	5206	5743	5606	3938
1948 FED FIRM SURPLUS/DEFICIT	5274	3349	4324	5993	4855	5866	5518	5162	5579	5547	3553
1949 FED FIRM SURPLUS/DEFICIT	8181	7642	4591	3619	3474	4532	5495	5359	5924	5943	4099
1950 FED FIRM SURPLUS/DEFICIT	2979	3026	3040	1957	1547	4386	5515	5140	5607	5574	3739
1951 FED FIRM SURPLUS/DEFICIT	8369	6913	4308	4698	5489	6209	5531	5183	5651	5633	3834
1952 FED FIRM SURPLUS/DEFICIT	8441	4934	3913	5542	3147	5749	5492	5296	5826	5859	4058
1953 FED FIRM SURPLUS/DEFICIT	5891	3023	4230	3639	3805	4497	5546	5232	4875	5071	3634
1954 FED FIRM SURPLUS/DEFICIT	6298	5444	4234	3696	3032	4371	5522	5166	5573	5529	3706
1955 FED FIRM SURPLUS/DEFICIT	8578	9036	6590	3609	3676	5363	5502	5569	5058	6128	2717
1956 FED FIRM SURPLUS/DEFICIT	7410	3645	4044	2540	4354	6202	5529	5150	5581	5529	3578
1957 FED FIRM SURPLUS/DEFICIT	7054	5764	3045	2288	2369	5786	5501	5315	5886	5896	4081

1958 FED FIRM SURPLUS/DEFICIT	3209	3023	4136	3664	3424	4171	5520	5347	5927	5672	3
1959 FED FIRM SURPLUS/DEFICIT	3500	3665	4160	3507	2998	5443	5541	5149	5562	5560	3
1960 FED FIRM SURPLUS/DEFICIT	7157	5544	7772	7833	6323	6026	5502	5245	5810	5879	3
1961 FED FIRM SURPLUS/DEFICIT	6412	3073	4329	3974	2784	4305	5502	5176	5635	5639	3
1962 FED FIRM SURPLUS/DEFICIT	3575	4549	4304	3629	3338	3920	5488	5538	6167	6323	4
1963 FED FIRM SURPLUS/DEFICIT	6064	4779	4165	3896	2792	5973	5508	5734	5603	6260	2
1964 FED FIRM SURPLUS/DEFICIT	5713	4605	4638	3575	3052	4188	5526	5199	5689	5680	3
1965 FED FIRM SURPLUS/DEFICIT	7474	5300	4178	4004	3681	6197	5530	5234	5701	5657	3
1966 FED FIRM SURPLUS/DEFICIT	8260	7523	4459	3783	3664	4960	5503	5789	5964	6251	3
1967 FED FIRM SURPLUS/DEFICIT	6547	3733	4260	3534	3406	3947	5524	5153	5618	5586	2
1968 FED FIRM SURPLUS/DEFICIT	8025	5422	4422	3139	3046	4631	5533	5447	6218	5340	2
1969 FED FIRM SURPLUS/DEFICIT	3673	5921	6035	5331	5119	5937	5517	5113	5606	5651	3
1970 FED FIRM SURPLUS/DEFICIT	3835	3010	3051	3010	2896	3978	5492	5999	6686	6483	3
1971 FED FIRM SURPLUS/DEFICIT	2983	3022	3150	2711	2918	4254	5511	5061	5551	5357	3
1972 FED FIRM SURPLUS/DEFICIT	8627	5660	3075	2648	2428	5395	5515	5075	5640	5715	3
1973 FED FIRM SURPLUS/DEFICIT	8609	7941	3073	3233	3189	5245	5200	4107	1978	1634	1
1974 FED FIRM SURPLUS/DEFICIT	2978	3021	3058	1956	1084	6041	5531	5427	5673	5502	3
1975 FED FIRM SURPLUS/DEFICIT	8633	7094	3303	3171	3141	3541	5519	5253	5822	4537	3
1976 FED FIRM SURPLUS/DEFICIT	4687	5701	3070	3693	4835	6179	5542	5121	5590	5607	3
1977 FED FIRM SURPLUS/DEFICIT	8597	9130	7531	3642	3436	4541	2302	375	1261	3268	3
1978 FED FIRM SURPLUS/DEFICIT	3107	3215	2971	1867	1946	3810	5459	5002	5632	5520	3
***Less PP&L contract**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1**
***Less cold weather adjustment**					**-1400**	**-1500**	**-1500**	**-1500**			
***Less SOR 5b reduction**	**-1100**	**-1100**	**-1400**	**-50**	**0**	**-500**	**-750**	**-600**	**-1600**	**-3400**	**-2**
***Add replacement of firm energy deficit**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1**
***Add firm capacity to meet Fed firm energy loads at C-E ratio of .81**	**665**	**665**	**665**	**665**	**665**	**665**	**665**	**665**	**665**	**665**	

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DATE: 03/05/93 MEDIUM LOAD FORECAST

PEAK IN MEGAWATTS	**AUG**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**	**JAN**	**FEB**	**MAR**	**APR**	
ADJUSTED	**1-15**	**16-31**								**1-15**	**1**
1929 FED FIRM SURPLUS/DEFICIT	**6579**	**3644**	**3406**	**4340**	**2652**	**3106**	**146**	**-246**	**1023**	**-425**	**1**
1930 FED FIRM SURPLUS/DEFICIT	**3457**	**3500**	**2510**	**3008**	**2210**	**2134**	**-136**	**-1425**	**679**	**326**	**1**
1931 FED FIRM SURPLUS/DEFICIT	**5602**	**4315**	**2477**	**3151**	**2113**	**2637**	**-198**	**-1720**	**3**	**2097**	
1932 FED FIRM SURPLUS/DEFICIT	**2642**	**3271**	**2409**	**2655**	**970**	**1618**	**2840**	**3704**	**4588**	**2858**	**1**
1933 FED FIRM SURPLUS/DEFICIT	**5118**	**5840**	**4031**	**4377**	**2423**	**3417**	**4108**	**3868**	**4806**	**2797**	**1**
1934 FED FIRM SURPLUS/DEFICIT	**8254**	**7352**	**3875**	**4750**	**5506**	**5022**	**4126**	**3925**	**4914**	**3126**	**1**
1935 FED FIRM SURPLUS/DEFICIT	**4042**	**3926**	**4066**	**4071**	**2298**	**3119**	**4062**	**4510**	**3472**	**1991**	**2**
1936 FED FIRM SURPLUS/DEFICIT	**7042**	**3707**	**4050**	**4504**	**3191**	**3459**	**3707**	**2247**	**4573**	**3144**	**2**
1937 FED FIRM SURPLUS/DEFICIT	**3749**	**3569**	**3559**	**4618**	**3317**	**3103**	**-364**	**486**	**950**	**648**	**1**
1938 FED FIRM SURPLUS/DEFICIT	**2724**	**2937**	**2462**	**2712**	**-187**	**1832**	**4100**	**3844**	**4927**	**2968**	**1**
1939 FED FIRM SURPLUS/DEFICIT	**3247**	**3151**	**4001**	**4679**	**3003**	**2960**	**2377**	**-1146**	**5150**	**3968**	**2**
1940 FED FIRM SURPLUS/DEFICIT	**4740**	**3730**	**3885**	**4803**	**3387**	**3188**	**2858**	**-632**	**5338**	**4782**	**3**
1941 FED FIRM SURPLUS/DEFICIT	**4372**	**3727**	**2573**	**3271**	**2359**	**2637**	**638**	**886**	**1030**	**2780**	**2**
1942 FED FIRM SURPLUS/DEFICIT	**5292**	**5214**	**2452**	**2990**	**2593**	**4959**	**4073**	**4509**	**3133**	**3738**	**2**
1943 FED FIRM SURPLUS/DEFICIT	**6201**	**4276**	**4072**	**4654**	**2713**	**3210**	**4106**	**3938**	**4914**	**3136**	**1**

1944 FED FIRM SURPLUS/DEFICIT	**6546**	**3423**	**3647**	**4412**	**3104**	**3100**	**-189**	**-724**	**-213**	**862**	**1554**
1945 FED FIRM SURPLUS/DEFICIT	**3006**	**2851**	**2516**	**2764**	**1208**	**1833**	**963**	**-369**	**1251**	**1808**	**687**
1946 FED FIRM SURPLUS/DEFICIT	**2739**	**2788**	**2520**	**2776**	**1356**	**1524**	**4139**	**3931**	**4951**	**2854**	**1874**
1947 FED FIRM SURPLUS/DEFICIT	**6378**	**4077**	**4009**	**4541**	**2557**	**4928**	**4135**	**3971**	**5008**	**3071**	**2003**
1948 FED FIRM SURPLUS/DEFICIT	**5039**	**3114**	**3789**	**6808**	**4320**	**4731**	**4133**	**3927**	**4844**	**3012**	**1618**
1949 FED FIRM SURPLUS/DEFICIT	**7946**	**7407**	**4056**	**4434**	**2939**	**3397**	**4110**	**4124**	**5189**	**3408**	**2164**
1950 FED FIRM SURPLUS/DEFICIT	**2744**	**2791**	**2505**	**2772**	**1012**	**3251**	**4130**	**3905**	**4872**	**3039**	**1804**
1951 FED FIRM SURPLUS/DEFICIT	**8134**	**6678**	**3773**	**5513**	**4954**	**5074**	**4146**	**3948**	**4916**	**3098**	**1899**
1952 FED FIRM SURPLUS/DEFICIT	**8206**	**4699**	**3378**	**6357**	**2612**	**4614**	**4107**	**4061**	**5091**	**3324**	**2123**
1953 FED FIRM SURPLUS/DEFICIT	**5656**	**2788**	**3695**	**4454**	**3270**	**3362**	**4161**	**3997**	**4140**	**2536**	**1699**
1954 FED FIRM SURPLUS/DEFICIT	**6063**	**5209**	**3699**	**4511**	**2497**	**3236**	**4137**	**3931**	**4838**	**2994**	**1771**
1955 FED FIRM SURPLUS/DEFICIT	**8343**	**8801**	**6055**	**4424**	**3141**	**4228**	**4117**	**4334**	**4323**	**3593**	**782**
1956 FED FIRM SURPLUS/DEFICIT	**7175**	**3410**	**3509**	**3355**	**3819**	**5067**	**4144**	**3915**	**4846**	**2994**	**1643**
1957 FED FIRM SURPLUS/DEFICIT	**6819**	**5529**	**2510**	**3103**	**1834**	**4651**	**4116**	**4080**	**5151**	**3361**	**2146**
1958 FED FIRM SURPLUS/DEFICIT	**2974**	**2788**	**3601**	**4479**	**2889**	**3036**	**4135**	**4112**	**5192**	**3137**	**1897**
1959 FED FIRM SURPLUS/DEFICIT	**3265**	**3430**	**3625**	**4322**	**2463**	**4308**	**4156**	**3914**	**4827**	**3025**	**1842**
1960 FED FIRM SURPLUS/DEFICIT	**6922**	**5309**	**7237**	**8648**	**5788**	**4891**	**4117**	**4010**	**5075**	**3344**	**1829**
1961 FED FIRM SURPLUS/DEFICIT	**6177**	**2838**	**3794**	**4789**	**2249**	**3170**	**4117**	**3941**	**4900**	**3104**	**1906**
1962 FED FIRM SURPLUS/DEFICIT	**3340**	**4314**	**3769**	**4444**	**2803**	**2785**	**4103**	**4303**	**5432**	**3788**	**2254**
1963 FED FIRM SURPLUS/DEFICIT	**5829**	**4544**	**3630**	**4711**	**2257**	**4838**	**4123**	**4499**	**4868**	**3725**	**1012**
1964 FED FIRM SURPLUS/DEFICIT	**5478**	**4370**	**4103**	**4390**	**2517**	**3053**	**4141**	**3964**	**4954**	**3145**	**1109**
1965 FED FIRM SURPLUS/DEFICIT	**7239**	**5065**	**3643**	**4819**	**3146**	**5062**	**4145**	**3999**	**4966**	**3122**	**1921**
1966 FED FIRM SURPLUS/DEFICIT	**8025**	**7288**	**3924**	**4598**	**3129**	**3825**	**4118**	**4554**	**5229**	**3716**	**1914**
1967 FED FIRM SURPLUS/DEFICIT	**6312**	**3498**	**3725**	**4349**	**2871**	**2812**	**4139**	**3918**	**4883**	**3051**	**542**
1968 FED FIRM SURPLUS/DEFICIT	**7790**	**5187**	**3887**	**3954**	**2511**	**3496**	**4148**	**4212**	**5483**	**2805**	**698**
1969 FED FIRM SURPLUS/DEFICIT	**3438**	**5686**	**5500**	**6146**	**4584**	**4802**	**4132**	**3878**	**4871**	**3116**	**1963**
1970 FED FIRM SURPLUS/DEFICIT	**3600**	**2775**	**2516**	**3825**	**2361**	**2843**	**4107**	**4764**	**5951**	**3948**	**1204**
1971 FED FIRM SURPLUS/DEFICIT	**2748**	**2787**	**2615**	**3526**	**2383**	**3119**	**4126**	**3826**	**4816**	**2822**	**1701**
1972 FED FIRM SURPLUS/DEFICIT	**8392**	**5425**	**2540**	**3463**	**1893**	**4260**	**4130**	**3840**	**4905**	**3180**	**1649**
1973 FED FIRM SURPLUS/DEFICIT	**8374**	**7706**	**2538**	**4048**	**2654**	**4110**	**3815**	**2872**	**1243**	**-901**	**-113**
1974 FED FIRM SURPLUS/DEFICIT	**2743**	**2786**	**2523**	**2771**	**549**	**4906**	**4146**	**4192**	**4938**	**2967**	**1553**
1975 FED FIRM SURPLUS/DEFICIT	**8398**	**6859**	**2768**	**3986**	**2606**	**2406**	**4134**	**4018**	**5087**	**2002**	**1811**
1976 FED FIRM SURPLUS/DEFICIT	**4452**	**5466**	**2535**	**4508**	**4300**	**5044**	**4157**	**3886**	**4855**	**3072**	**1865**
1977 FED FIRM SURPLUS/DEFICIT	**8362**	**8895**	**6996**	**4457**	**2901**	**3406**	**917**	**-860**	**526**	**733**	**1749**
1978 FED FIRM SURPLUS/DEFICIT	**2872**	**2980**	**2436**	**2682**	**1411**	**2675**	**4074**	**3767**	**4897**	**2985**	**1805**

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RUN DATE: 03/05/93 MEDIUM LOAD
FORECAST

PEAK IN MEGAWATTS	AUG	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	APR
UNADJUSTED	1-15	16-31								1-15	16-30
1929 FED FIRM SURPLUS/DEFICIT	7254	4319	4373	4215	3280	4337	1570	1031	2090	2176	3280
1930 FED FIRM SURPLUS/DEFICIT	4132	4174	3477	2884	2839	3365	1288	-148	1746	2927	3182
1931 FED FIRM SURPLUS/DEFICIT	6277	4989	3444	3026	2742	3867	1226	-443	1069	4698	2408
1932 FED FIRM SURPLUS/DEFICIT	3316	3946	3376	2530	1599	2848	4265	4982	5654	5460	3662
1933 FED FIRM SURPLUS/DEFICIT	5792	6514	4999	4252	3051	4647	5532	5144	5872	5398	3798
1934 FED FIRM SURPLUS/DEFICIT	8929	8026	4843	4625	6135	6252	5550	5202	5981	5727	3996
1935 FED FIRM SURPLUS/DEFICIT	4717	4600	5033	3947	2927	4349	5486	5786	4539	4592	4057
1936 FED FIRM SURPLUS/DEFICIT	7716	4381	5017	4379	3820	4690	5131	3524	5639	5745	4153

1937 FED FIRM SURPLUS/DEFICIT	4424	4244	4526	4493	3945	4333	1060	1763	2017	3249	3
1938 FED FIRM SURPLUS/DEFICIT	3398	3612	3429	2587	442	3062	5524	5121	5993	5569	3
1939 FED FIRM SURPLUS/DEFICIT	3921	3826	4968	4554	3632	4190	3801	130	6217	6569	4
1940 FED FIRM SURPLUS/DEFICIT	5414	4405	4853	4678	4015	4419	4283	645	6405	7383	5
1941 FED FIRM SURPLUS/DEFICIT	5046	4401	3541	3146	2987	3867	2062	2163	2097	5381	4
1942 FED FIRM SURPLUS/DEFICIT	5967	5889	3419	2865	3222	6189	5497	5786	4200	6339	4
1943 FED FIRM SURPLUS/DEFICIT	6876	4951	5039	4529	3342	4440	5530	5214	5981	5737	3
1944 FED FIRM SURPLUS/DEFICIT	7221	4098	4615	4288	3732	4330	1235	553	854	3463	3
1945 FED FIRM SURPLUS/DEFICIT	3681	3525	3483	2639	1837	3063	2387	908	2317	4409	2
1946 FED FIRM SURPLUS/DEFICIT	3413	3463	3487	2651	1984	2754	5563	5208	6018	5455	3
1947 FED FIRM SURPLUS/DEFICIT	7053	4752	4977	4417	3186	6158	5559	5248	6074	5672	4
1948 FED FIRM SURPLUS/DEFICIT	5713	3789	4757	6683	4949	5961	5557	5204	5911	5613	3
1949 FED FIRM SURPLUS/DEFICIT	8621	8081	5024	4309	3568	4627	5535	5401	6256	6009	4
1950 FED FIRM SURPLUS/DEFICIT	3418	3466	3472	2647	1641	4481	5554	5182	5938	5640	3
1951 FED FIRM SURPLUS/DEFICIT	8808	7353	4740	5388	5583	6304	5570	5225	5982	5699	3
1952 FED FIRM SURPLUS/DEFICIT	8881	5374	4346	6232	3241	5844	5531	5338	6158	5925	4
1953 FED FIRM SURPLUS/DEFICIT	6331	3463	4662	4329	3899	4593	5586	5274	5206	5137	3
1954 FED FIRM SURPLUS/DEFICIT	6738	5884	4666	4386	3126	4466	5561	5207	5904	5595	3
1955 FED FIRM SURPLUS/DEFICIT	9018	9476	7022	4299	3769	5458	5541	5610	5390	6194	2
1956 FED FIRM SURPLUS/DEFICIT	7850	4084	4476	3230	4448	6297	5568	5192	5912	5595	3
1957 FED FIRM SURPLUS/DEFICIT	7494	6204	3477	2979	2463	5881	5540	5357	6218	5962	4
1958 FED FIRM SURPLUS/DEFICIT	3649	3463	4569	4354	3518	4267	5560	5389	6258	5739	3
1959 FED FIRM SURPLUS/DEFICIT	3939	4104	4592	4197	3092	5538	5580	5190	5894	5625	3
1960 FED FIRM SURPLUS/DEFICIT	7597	5984	8204	8523	6417	6121	5541	5287	6141	5945	3
1961 FED FIRM SURPLUS/DEFICIT	6852	3512	4761	4665	2878	4400	5541	5218	5967	5705	3
1962 FED FIRM SURPLUS/DEFICIT	4015	4988	4736	4320	3432	4016	5527	5580	6499	6389	4
1963 FED FIRM SURPLUS/DEFICIT	6503	5219	4597	4586	2886	6069	5548	5775	5934	6326	3
1964 FED FIRM SURPLUS/DEFICIT	6153	5045	5071	4266	3146	4283	5565	5241	6020	5746	3
1965 FED FIRM SURPLUS/DEFICIT	7914	5740	4611	4694	3775	6292	5569	5276	6032	5723	3
1966 FED FIRM SURPLUS/DEFICIT	8700	7963	4891	4474	3757	5055	5542	5832	6295	6317	3
1967 FED FIRM SURPLUS/DEFICIT	6987	4172	4693	4224	3500	4042	5564	5194	5950	5652	2
1968 FED FIRM SURPLUS/DEFICIT	8465	5862	4854	3829	3139	4726	5572	5488	6549	5406	2
1969 FED FIRM SURPLUS/DEFICIT	4113	6361	6468	6021	5213	6032	5556	5154	5937	5717	3
1970 FED FIRM SURPLUS/DEFICIT	4274	3450	3484	3700	2990	4073	5531	6041	7017	6549	3
1971 FED FIRM SURPLUS/DEFICIT	3422	3462	3583	3401	3011	4349	5550	5103	5883	5423	3
1972 FED FIRM SURPLUS/DEFICIT	9067	6099	3507	3338	2522	5490	5554	5117	5971	5781	3
1973 FED FIRM SURPLUS/DEFICIT	9049	8381	3505	3923	3283	5340	5240	4149	2310	1700	1
1974 FED FIRM SURPLUS/DEFICIT	3417	3461	3490	2646	1178	6136	5570	5468	6004	5568	3
1975 FED FIRM SURPLUS/DEFICIT	9073	7534	3735	3861	3234	3636	5558	5295	6153	4603	3
1976 FED FIRM SURPLUS/DEFICIT	5127	6140	3502	4383	4929	6274	5581	5162	5921	5673	3
1977 FED FIRM SURPLUS/DEFICIT	9037	9569	7963	4332	3529	4636	2341	416	1593	3334	3
1978 FED FIRM SURPLUS/DEFICIT	3547	3655	3403	2557	2039	3905	5498	5044	5964	5586	3
***Less PP&L contract**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1**
***Less cold weather adjustment**					**-1400**	**-1500**	**-1500**	**-1500**			
***Less SOR 5b reduction**	**-1100**	**-1100**	**-1400**	**-50**	**0**	**-500**	**-750**	**-600**	**-1600**	**-3400**	**-2**
***Add replacement of firm energy deficit**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1**
***Add firm capacity to meet Fed firm energy loads at C-E ratio of .81**	**665**	**665**	**665**	**665**	**665**	**665**	**665**	**665**	**665**	**665**	

2001- 2
OPERATING YEAR RUN
DATE: 03/05/93 MEDIUM LOAD
FORECAST

PEAK IN MEGAWATTS ADJUSTED	AUG 1-15	AUG 16-31	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR 1-15	APR 16-30
1929 FED FIRM SURPLUS/DEFICIT	7019	4084	3838	5030	2745	3202	185	-204	1355	-359	1345
1930 FED FIRM SURPLUS/DEFICIT	3897	3939	2942	3699	2304	2230	-97	-1383	1011	392	1247
1931 FED FIRM SURPLUS/DEFICIT	6042	4754	2909	3841	2207	2732	-159	-1678	334	2163	473
1932 FED FIRM SURPLUS/DEFICIT	3081	3711	2841	3345	1064	1713	2880	3747	4919	2925	1727
1933 FED FIRM SURPLUS/DEFICIT	5557	6279	4464	5067	2516	3512	4147	3909	5137	2863	1863
1934 FED FIRM SURPLUS/DEFICIT	8694	7791	4308	5440	5600	5117	4165	3967	5246	3192	2061
1935 FED FIRM SURPLUS/DEFICIT	4482	4365	4498	4762	2392	3214	4101	4551	3804	2057	2122
1936 FED FIRM SURPLUS/DEFICIT	7481	4146	4482	5194	3285	3555	3746	2289	4904	3210	2218
1937 FED FIRM SURPLUS/DEFICIT	4189	4009	3991	5308	3410	3198	-325	528	1282	714	1514
1938 FED FIRM SURPLUS/DEFICIT	3163	3377	2894	3402	-93	1927	4139	3886	5258	3034	1786
1939 FED FIRM SURPLUS/DEFICIT	3686	3591	4433	5369	3097	3055	2416	-1105	5482	4034	2735
1940 FED FIRM SURPLUS/DEFICIT	5179	4170	4318	5493	3480	3284	2898	-590	5670	4848	3511
1941 FED FIRM SURPLUS/DEFICIT	4811	4166	3006	3961	2452	2732	677	928	1362	2846	2155
1942 FED FIRM SURPLUS/DEFICIT	5732	5654	2884	3680	2687	5054	4112	4551	3465	3804	2095
1943 FED FIRM SURPLUS/DEFICIT	6641	4716	4504	5344	2807	3305	4145	3979	5246	3202	2002
1944 FED FIRM SURPLUS/DEFICIT	6986	3863	4080	5103	3197	3195	-150	-682	119	928	1620
1945 FED FIRM SURPLUS/DEFICIT	3446	3290	2948	3454	1302	1928	1002	-327	1582	1874	753
1946 FED FIRM SURPLUS/DEFICIT	3178	3228	2952	3466	1449	1619	4178	3973	5283	2920	1940
1947 FED FIRM SURPLUS/DEFICIT	6818	4517	4442	5232	2651	5023	4174	4013	5339	3137	2069
1948 FED FIRM SURPLUS/DEFICIT	5478	3554	4222	7498	4414	4826	4172	3969	5176	3078	1684
1949 FED FIRM SURPLUS/DEFICIT	8386	7846	4489	5124	3033	3492	4150	4166	5521	3474	2230
1950 FED FIRM SURPLUS/DEFICIT	3183	3231	2937	3462	1106	3346	4169	3947	5203	3105	1870
1951 FED FIRM SURPLUS/DEFICIT	8573	7118	4205	6203	5048	5169	4185	3990	5247	3164	1965
1952 FED FIRM SURPLUS/DEFICIT	8646	5139	3811	7047	2706	4709	4146	4103	5423	3390	2189
1953 FED FIRM SURPLUS/DEFICIT	6096	3228	4127	5144	3364	3458	4201	4039	4471	2602	1765
1954 FED FIRM SURPLUS/DEFICIT	6503	5649	4131	5201	2591	3331	4176	3972	5169	3060	1837
1955 FED FIRM SURPLUS/DEFICIT	8783	9241	6487	5114	3234	4323	4156	4375	4655	3659	848
1956 FED FIRM SURPLUS/DEFICIT	7615	3849	3941	4045	3913	5162	4183	3957	5177	3060	1709
1957 FED FIRM SURPLUS/DEFICIT	7259	5969	2942	3794	1928	4746	4155	4122	5483	3427	2212
1958 FED FIRM SURPLUS/DEFICIT	3414	3228	4034	5169	2983	3132	4175	4154	5523	3204	1963
1959 FED FIRM SURPLUS/DEFICIT	3704	3869	4057	5012	2557	4403	4195	3955	5159	3090	1908
1960 FED FIRM SURPLUS/DEFICIT	7362	5749	7669	9338	5882	4986	4156	4052	5406	3410	1895
1961 FED FIRM SURPLUS/DEFICIT	6617	3277	4226	5480	2343	3265	4156	3983	5232	3170	1972
1962 FED FIRM SURPLUS/DEFICIT	3780	4753	4201	5135	2897	2881	4142	4345	5764	3854	2320
1963 FED FIRM SURPLUS/DEFICIT	6268	4984	4062	5401	2351	4934	4163	4540	5199	3791	1078
1964 FED FIRM SURPLUS/DEFICIT	5918	4810	4536	5081	2611	3148	4180	4006	5285	3211	1175
1965 FED FIRM SURPLUS/DEFICIT	7679	5505	4076	5509	3240	5157	4184	4041	5297	3188	1987
1966 FED FIRM SURPLUS/DEFICIT	8465	7728	4356	5289	3222	3920	4157	4597	5560	3782	1980
1967 FED FIRM SURPLUS/DEFICIT	6752	3937	4158	5039	2965	2907	4179	3959	5215	3117	608
1968 FED FIRM SURPLUS/DEFICIT	8230	5627	4319	4644	2604	3591	4187	4253	5814	2871	764
1969 FED FIRM SURPLUS/DEFICIT	3878	6126	5933	6836	4678	4897	4171	3919	5202	3182	2029
1970 FED FIRM SURPLUS/DEFICIT	4039	3215	2949	4515	2455	2938	4146	4806	6282	4014	1270
1971 FED FIRM SURPLUS/DEFICIT	3187	3227	3048	4216	2476	3214	4165	3868	5148	2888	1767
1972 FED FIRM SURPLUS/DEFICIT	8832	5864	2972	4153	1987	4355	4169	3882	5236	3246	1715
1973 FED FIRM SURPLUS/DEFICIT	8814	8146	2970	4738	2748	4205	3855	2914	1575	-835	-47

1974 FED FIRM SURPLUS/DEFICIT	**3182**	**3226**	**2955**	**3461**	**643**	**5001**	**4185**	**4233**	**5269**	**3033**	1
1975 FED FIRM SURPLUS/DEFICIT	**8838**	**7299**	**3200**	**4676**	**2699**	**2501**	**4173**	**4060**	**5418**	**2068**	1
1976 FED FIRM SURPLUS/DEFICIT	**4892**	**5905**	**2967**	**5198**	**4394**	**5139**	**4196**	**3927**	**5186**	**3138**	1
1977 FED FIRM SURPLUS/DEFICIT	**8802**	**9334**	**7428**	**5147**	**2994**	**3501**	**956**	**-819**	**858**	**799**	1
1978 FED FIRM SURPLUS/DEFICIT	**3312**	**3420**	**2868**	**3372**	**1504**	**2770**	**4113**	**3809**	**5229**	**3051**	1

2002- 3

OPERATING YEAR

RUN DATE: 03/05/93 MEDIUM LOAD FORECAST

PEAK IN MEGAWATTS	AUG	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	A
UNADJUSTED	1-15	16-31								1-15	16
1929 FED FIRM SURPLUS/DEFICIT	7185	4250	4304	4137	3156	4210	1430	903	1977	1708	2
1930 FED FIRM SURPLUS/DEFICIT	4063	4105	3408	2806	2714	3238	1148	-275	1634	2459	2
1931 FED FIRM SURPLUS/DEFICIT	6208	4920	3375	2948	2617	3740	1086	-570	957	4230	1
1932 FED FIRM SURPLUS/DEFICIT	3247	3877	3307	2453	1474	2721	4124	4855	5542	4991	3
1933 FED FIRM SURPLUS/DEFICIT	5723	6445	4929	4174	2927	4521	5392	5017	5760	4930	3
1934 FED FIRM SURPLUS/DEFICIT	8860	7958	4773	4547	6010	6125	5410	5075	5869	5259	3
1935 FED FIRM SURPLUS/DEFICIT	4648	4531	4964	3869	2802	4222	5346	5659	4427	4124	3
1936 FED FIRM SURPLUS/DEFICIT	7648	4313	4948	4301	3695	4563	4991	3397	5527	5277	3
1937 FED FIRM SURPLUS/DEFICIT	4355	4175	4457	4415	3820	4206	920	1636	1905	2781	2
1938 FED FIRM SURPLUS/DEFICIT	3329	3543	3360	2510	317	2935	5384	4993	5881	5101	3
1939 FED FIRM SURPLUS/DEFICIT	3852	3757	4899	4476	3507	4063	3661	3	6105	6101	4
1940 FED FIRM SURPLUS/DEFICIT	5345	4336	4783	4600	3891	4292	4142	518	6293	6915	4
1941 FED FIRM SURPLUS/DEFICIT	4978	4333	3471	3068	2862	3740	1922	2035	1985	4912	3
1942 FED FIRM SURPLUS/DEFICIT	5898	5820	3350	2788	3097	6062	5357	5659	4088	5871	3
1943 FED FIRM SURPLUS/DEFICIT	6807	4882	4970	4452	3217	4313	5390	5087	5869	5269	3
1944 FED FIRM SURPLUS/DEFICIT	7152	4029	4545	4210	3608	4203	1095	426	742	2995	3
1945 FED FIRM SURPLUS/DEFICIT	3612	3456	3414	2562	1712	2936	2247	781	2205	3941	2
1946 FED FIRM SURPLUS/DEFICIT	3344	3394	3418	2574	1860	2627	5423	5080	5905	4987	3
1947 FED FIRM SURPLUS/DEFICIT	6984	4683	4907	4339	3061	6031	5419	5121	5962	5204	3
1948 FED FIRM SURPLUS/DEFICIT	5645	3720	4687	6605	4824	5834	5417	5077	5799	5145	3
1949 FED FIRM SURPLUS/DEFICIT	8552	8013	4954	4232	3443	4500	5394	5273	6143	5541	3
1950 FED FIRM SURPLUS/DEFICIT	3349	3397	3403	2570	1516	4354	5414	5054	5826	5172	3
1951 FED FIRM SURPLUS/DEFICIT	8739	7284	4671	5310	5458	6177	5430	5098	5870	5231	3
1952 FED FIRM SURPLUS/DEFICIT	8812	5305	4276	6154	3116	5717	5391	5209	6045	5457	3
1953 FED FIRM SURPLUS/DEFICIT	6262	3394	4593	4252	3774	4466	5445	5146	5094	4669	3
1954 FED FIRM SURPLUS/DEFICIT	6669	5815	4597	4308	3001	4339	5421	5080	5792	5127	3
1955 FED FIRM SURPLUS/DEFICIT	8949	9407	6953	4222	3644	5331	5401	5483	5277	5726	2
1956 FED FIRM SURPLUS/DEFICIT	7781	4015	4407	3152	4323	6170	5428	5065	5800	5127	3
1957 FED FIRM SURPLUS/DEFICIT	7425	6135	3408	2901	2338	5754	5400	5230	6106	5494	3
1958 FED FIRM SURPLUS/DEFICIT	3580	3394	4499	4277	3393	4140	5419	5262	6146	5270	3
1959 FED FIRM SURPLUS/DEFICIT	3871	4035	4523	4120	2967	5411	5440	5063	5781	5156	3
1960 FED FIRM SURPLUS/DEFICIT	7528	5915	8135	8445	6292	5994	5401	5160	6029	5476	3
1961 FED FIRM SURPLUS/DEFICIT	6783	3444	4692	4587	2753	4273	5401	5091	5855	5237	3
1962 FED FIRM SURPLUS/DEFICIT	3946	4919	4667	4242	3307	3889	5387	5453	6387	5921	3
1963 FED FIRM SURPLUS/DEFICIT	6435	5150	4528	4508	2761	5942	5407	5648	5822	5857	2
1964 FED FIRM SURPLUS/DEFICIT	6084	4976	5001	4188	3021	4157	5425	5114	5908	5278	2
1965 FED FIRM SURPLUS/DEFICIT	7845	5671	4541	4616	3650	6165	5429	5149	5920	5255	3

1966 FED FIRM SURPLUS/DEFICIT	8631	7894	4822	4396	3633	4928	5402	5704	6183	5849	3447
1967 FED FIRM SURPLUS/DEFICIT	6918	4104	4623	4147	3375	3915	5423	5067	5838	5184	2075
1968 FED FIRM SURPLUS/DEFICIT	8396	5793	4785	3751	3014	4599	5432	5361	6437	4938	2231
1969 FED FIRM SURPLUS/DEFICIT	4044	6292	6398	5944	5088	5905	5416	5027	5825	5250	3496
1970 FED FIRM SURPLUS/DEFICIT	4205	3381	3414	3623	2865	3946	5390	5914	6905	6081	2737
1971 FED FIRM SURPLUS/DEFICIT	3353	3393	3513	3323	2886	4222	5410	4976	5771	4955	3234
1972 FED FIRM SURPLUS/DEFICIT	8998	6031	3438	3260	2397	5363	5414	4990	5859	5313	3182
1973 FED FIRM SURPLUS/DEFICIT	8980	8312	3436	3846	3158	5213	5099	4021	2198	1232	1419
1974 FED FIRM SURPLUS/DEFICIT	3348	3392	3421	2569	1053	6009	5430	5341	5892	5100	3086
1975 FED FIRM SURPLUS/DEFICIT	9004	7465	3666	3783	3110	3509	5418	5168	6041	4134	3344
1976 FED FIRM SURPLUS/DEFICIT	5058	6072	3433	4305	4804	6147	5441	5035	5809	5205	3397
1977 FED FIRM SURPLUS/DEFICIT	8968	9500	7894	4255	3405	4509	2201	289	1481	2866	3282
1978 FED FIRM SURPLUS/DEFICIT	3478	3586	3334	2480	1914	3778	5358	4917	5851	5118	3338
***Less PP&L contract**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**
***Less cold weather adjustment**					**-1400**	**-1500**	**-1500**	**-1500**			
***Less SOR 5b reduction**	**-1100**	**-1100**	**-1400**	**-50**	**0**	**-500**	**-750**	**-600**	**-1600**	**-3400**	**-2800**
***Add replacement of firm energy deficit**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**
***Add firm capacity to meet Fed firm energy loads at C-E ratio of .83**	**735**	**735**	**735**	**735**	**735**	**735**	**735**	**735**	**735**	**735**	**735**

2002- 3
OPERATING YEAR RUN
DATE: 03/05/93 MEDIUM LOAD FORECAST

PEAK IN MEGAWATTS ADJUSTED	**AUG 1-15**	**AUG 16-31**	**SEP**	**OCT**	**NOV**	**DEC**	**JAN**	**FEB**	**MAR**	**APR 1-15**	**APR 16-30**
1929 FED FIRM SURPLUS/DEFICIT	**7020**	**4085**	**3839**	**5022**	**2691**	**3145**	**115**	**-262**	**1312**	**-757**	**946**
1930 FED FIRM SURPLUS/DEFICIT	**3898**	**3940**	**2943**	**3691**	**2249**	**2173**	**-167**	**-1440**	**969**	**-6**	**849**
1931 FED FIRM SURPLUS/DEFICIT	**6043**	**4755**	**2910**	**3833**	**2152**	**2675**	**-229**	**-1735**	**292**	**1765**	**74**
1932 FED FIRM SURPLUS/DEFICIT	**3082**	**3712**	**2842**	**3338**	**1009**	**1656**	**2809**	**3690**	**4877**	**2526**	**1329**
1933 FED FIRM SURPLUS/DEFICIT	**5558**	**6280**	**4464**	**5059**	**2462**	**3456**	**4077**	**3852**	**5095**	**2465**	**1465**
1934 FED FIRM SURPLUS/DEFICIT	**8695**	**7793**	**4308**	**5432**	**5545**	**5060**	**4095**	**3910**	**5204**	**2794**	**1663**
1935 FED FIRM SURPLUS/DEFICIT	**4483**	**4366**	**4499**	**4754**	**2337**	**3157**	**4031**	**4494**	**3762**	**1659**	**1723**
1936 FED FIRM SURPLUS/DEFICIT	**7483**	**4148**	**4483**	**5186**	**3230**	**3498**	**3676**	**2232**	**4862**	**2812**	**1820**
1937 FED FIRM SURPLUS/DEFICIT	**4190**	**4010**	**3992**	**5300**	**3355**	**3141**	**-395**	**471**	**1240**	**316**	**1116**
1938 FED FIRM SURPLUS/DEFICIT	**3164**	**3378**	**2895**	**3395**	**-148**	**1870**	**4069**	**3828**	**5216**	**2636**	**1388**
1939 FED FIRM SURPLUS/DEFICIT	**3687**	**3592**	**4434**	**5361**	**3042**	**2998**	**2346**	**-1162**	**5440**	**3636**	**2336**
1940 FED FIRM SURPLUS/DEFICIT	**5180**	**4171**	**4318**	**5485**	**3426**	**3227**	**2827**	**-647**	**5628**	**4450**	**3113**
1941 FED FIRM SURPLUS/DEFICIT	**4813**	**4168**	**3006**	**3953**	**2397**	**2675**	**607**	**870**	**1320**	**2447**	**1757**
1942 FED FIRM SURPLUS/DEFICIT	**5733**	**5655**	**2885**	**3673**	**2632**	**4997**	**4042**	**4494**	**3423**	**3406**	**1697**
1943 FED FIRM SURPLUS/DEFICIT	**6642**	**4717**	**4505**	**5337**	**2752**	**3248**	**4075**	**3922**	**5204**	**2804**	**1604**
1944 FED FIRM SURPLUS/DEFICIT	**6987**	**3864**	**4080**	**5095**	**3143**	**3138**	**-220**	**-739**	**77**	**530**	**1222**
1945 FED FIRM SURPLUS/DEFICIT	**3447**	**3291**	**2949**	**3447**	**1247**	**1871**	**932**	**-384**	**1540**	**1476**	**355**
1946 FED FIRM SURPLUS/DEFICIT	**3179**	**3229**	**2953**	**3459**	**1395**	**1562**	**4108**	**3915**	**5240**	**2522**	**1542**
1947 FED FIRM SURPLUS/DEFICIT	**6819**	**4518**	**4442**	**5224**	**2596**	**4966**	**4104**	**3956**	**5297**	**2739**	**1671**
1948 FED FIRM SURPLUS/DEFICIT	**5480**	**3555**	**4222**	**7490**	**4359**	**4769**	**4102**	**3912**	**5134**	**2680**	**1285**
1949 FED FIRM SURPLUS/DEFICIT	**8387**	**7848**	**4489**	**5117**	**2978**	**3435**	**4079**	**4108**	**5478**	**3076**	**1832**
1950 FED FIRM SURPLUS/DEFICIT	**3184**	**3232**	**2938**	**3455**	**1051**	**3289**	**4099**	**3889**	**5161**	**2707**	**1472**
1951 FED FIRM SURPLUS/DEFICIT	**8574**	**7119**	**4206**	**6195**	**4993**	**5112**	**4115**	**3933**	**5205**	**2766**	**1566**
1952 FED FIRM SURPLUS/DEFICIT	**8647**	**5140**	**3811**	**7039**	**2651**	**4652**	**4076**	**4044**	**5380**	**2992**	**1791**

1953 FED FIRM SURPLUS/DEFICIT	**6097**	**3229**	**4128**	**5137**	**3309**	**3401**	**4130**	**3981**	**4429**	**2204**	1
1954 FED FIRM SURPLUS/DEFICIT	**6504**	**5650**	**4132**	**5193**	**2536**	**3274**	**4106**	**3915**	**5127**	**2662**	1
1955 FED FIRM SURPLUS/DEFICIT	**8784**	**9242**	**6488**	**5107**	**3179**	**4266**	**4086**	**4318**	**4612**	**3261**	
1956 FED FIRM SURPLUS/DEFICIT	**7616**	**3850**	**3942**	**4037**	**3858**	**5105**	**4113**	**3900**	**5135**	**2662**	1
1957 FED FIRM SURPLUS/DEFICIT	**7260**	**5970**	**2943**	**3786**	**1873**	**4689**	**4085**	**4065**	**5441**	**3029**	1
1958 FED FIRM SURPLUS/DEFICIT	**3415**	**3229**	**4034**	**5162**	**2928**	**3075**	**4104**	**4097**	**5481**	**2805**	1
1959 FED FIRM SURPLUS/DEFICIT	**3706**	**3870**	**4058**	**5005**	**2502**	**4346**	**4125**	**3898**	**5116**	**2691**	1
1960 FED FIRM SURPLUS/DEFICIT	**7363**	**5750**	**7670**	**9330**	**5827**	**4929**	**4086**	**3995**	**5364**	**3011**	1
1961 FED FIRM SURPLUS/DEFICIT	**6618**	**3279**	**4227**	**5472**	**2288**	**3208**	**4086**	**3926**	**5190**	**2772**	1
1962 FED FIRM SURPLUS/DEFICIT	**3781**	**4754**	**4202**	**5127**	**2842**	**2824**	**4072**	**4288**	**5722**	**3456**	1
1963 FED FIRM SURPLUS/DEFICIT	**6270**	**4985**	**4063**	**5393**	**2296**	**4877**	**4092**	**4483**	**5157**	**3392**	
1964 FED FIRM SURPLUS/DEFICIT	**5919**	**4811**	**4536**	**5073**	**2556**	**3092**	**4110**	**3949**	**5243**	**2813**	
1965 FED FIRM SURPLUS/DEFICIT	**7680**	**5506**	**4076**	**5501**	**3185**	**5100**	**4114**	**3984**	**5255**	**2790**	1
1966 FED FIRM SURPLUS/DEFICIT	**8466**	**7729**	**4357**	**5281**	**3168**	**3863**	**4087**	**4539**	**5518**	**3384**	1
1967 FED FIRM SURPLUS/DEFICIT	**6753**	**3939**	**4158**	**5032**	**2910**	**2850**	**4108**	**3902**	**5173**	**2719**	
1968 FED FIRM SURPLUS/DEFICIT	**8231**	**5628**	**4320**	**4636**	**2549**	**3534**	**4117**	**4196**	**5772**	**2473**	
1969 FED FIRM SURPLUS/DEFICIT	**3879**	**6127**	**5933**	**6829**	**4623**	**4840**	**4101**	**3862**	**5160**	**2785**	1
1970 FED FIRM SURPLUS/DEFICIT	**4040**	**3216**	**2949**	**4508**	**2400**	**2881**	**4075**	**4749**	**6240**	**3616**	
1971 FED FIRM SURPLUS/DEFICIT	**3188**	**3228**	**3048**	**4208**	**2421**	**3157**	**4095**	**3811**	**5106**	**2490**	1
1972 FED FIRM SURPLUS/DEFICIT	**8833**	**5866**	**2973**	**4145**	**1932**	**4298**	**4099**	**3825**	**5194**	**2848**	1
1973 FED FIRM SURPLUS/DEFICIT	**8815**	**8147**	**2971**	**4731**	**2693**	**4148**	**3784**	**2856**	**1533**	**-1233**	
1974 FED FIRM SURPLUS/DEFICIT	**3183**	**3227**	**2956**	**3454**	**588**	**4944**	**4115**	**4176**	**5227**	**2635**	1
1975 FED FIRM SURPLUS/DEFICIT	**8839**	**7300**	**3201**	**4668**	**2645**	**2444**	**4103**	**4003**	**5376**	**1669**	1
1976 FED FIRM SURPLUS/DEFICIT	**4893**	**5907**	**2968**	**5190**	**4339**	**5082**	**4126**	**3870**	**5144**	**2740**	1
1977 FED FIRM SURPLUS/DEFICIT	**8803**	**9335**	**7429**	**5140**	**2940**	**3444**	**886**	**-876**	**816**	**401**	1
1978 FED FIRM SURPLUS/DEFICIT	**3313**	**3421**	**2869**	**3365**	**1449**	**2713**	**4043**	**3752**	**5186**	**2653**	1

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OPERATING YEAR
RUN DATE: 03/05/93 MEDIUM LOAD FORECAST

PEAK IN MEGAWATTS	AUG	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	A
UNADJUSTED	1-15	16-31								1-15	16
1929 FED FIRM SURPLUS/DEFICIT	6783	3848	3895	3731	2687	3742	925	407	1495	1570	2
1930 FED FIRM SURPLUS/DEFICIT	3661	3703	3000	2400	2245	2770	643	-772	1151	2321	2
1931 FED FIRM SURPLUS/DEFICIT	5806	4518	2967	2542	2148	3273	581	-1067	474	4092	1
1932 FED FIRM SURPLUS/DEFICIT	2845	3475	2899	2046	1005	2254	3620	4358	5059	4853	3
1933 FED FIRM SURPLUS/DEFICIT	5322	6043	4521	3768	2458	4053	4887	4520	5277	4792	3
1934 FED FIRM SURPLUS/DEFICIT	8458	7556	4365	4141	5541	5658	4905	4578	5386	5121	3
1935 FED FIRM SURPLUS/DEFICIT	4246	4129	4556	3463	2333	3755	4841	5162	3944	3986	3
1936 FED FIRM SURPLUS/DEFICIT	7246	3911	4539	3895	3226	4095	4486	2900	5044	5139	3
1937 FED FIRM SURPLUS/DEFICIT	3953	3773	4048	4009	3351	3739	415	1139	1422	2644	2
1938 FED FIRM SURPLUS/DEFICIT	2927	3141	2952	2103	-152	2468	4879	4497	5398	4963	3
1939 FED FIRM SURPLUS/DEFICIT	3450	3355	4490	4070	3038	3596	3156	-493	5622	5964	4
1940 FED FIRM SURPLUS/DEFICIT	4943	3934	4375	4194	3422	3824	3637	21	5810	6777	4
1941 FED FIRM SURPLUS/DEFICIT	4576	3931	3063	2662	2393	3273	1417	1539	1502	4775	3
1942 FED FIRM SURPLUS/DEFICIT	5496	5418	2942	2381	2628	5595	4852	5162	3605	5734	3
1943 FED FIRM SURPLUS/DEFICIT	6405	4480	4562	4045	2748	3845	4885	4590	5386	5131	3
1944 FED FIRM SURPLUS/DEFICIT	6750	3627	4137	3804	3138	3736	590	-71	259	2857	2

1945 FED FIRM SURPLUS/DEFICIT	3210	3054	3006	2155	1243	2469	1742	284	1722	3803	2083
1946 FED FIRM SURPLUS/DEFICIT	2942	2992	3010	2167	1390	2160	4918	4583	5423	4849	3270
1947 FED FIRM SURPLUS/DEFICIT	6582	4281	4499	3933	2592	5564	4914	4624	5479	5067	3399
1948 FED FIRM SURPLUS/DEFICIT	5243	3318	4279	6199	4355	5367	4912	4580	5316	5007	3014
1949 FED FIRM SURPLUS/DEFICIT	8150	7611	4546	3825	2974	4033	4890	4777	5661	5403	3560
1950 FED FIRM SURPLUS/DEFICIT	2947	2995	2995	2163	1047	3887	4909	4558	5343	5034	3200
1951 FED FIRM SURPLUS/DEFICIT	8337	6882	4262	4904	4989	5710	4925	4601	5387	5093	3295
1952 FED FIRM SURPLUS/DEFICIT	8410	4903	3868	5748	2647	5250	4886	4714	5562	5319	3519
1953 FED FIRM SURPLUS/DEFICIT	5860	2992	4184	3845	3305	3998	4941	4650	4611	4531	3095
1954 FED FIRM SURPLUS/DEFICIT	6267	5413	4188	3902	2532	3872	4916	4583	5309	4989	3167
1955 FED FIRM SURPLUS/DEFICIT	8547	9005	6544	3815	3175	4864	4896	4986	4794	5588	2178
1956 FED FIRM SURPLUS/DEFICIT	7379	3613	3999	2746	3854	5703	4923	4568	5317	4989	3039
1957 FED FIRM SURPLUS/DEFICIT	7023	5733	2999	2495	1869	5287	4895	4733	5623	5356	3542
1958 FED FIRM SURPLUS/DEFICIT	3178	2992	4091	3870	2924	3672	4915	4765	5663	5133	3293
1959 FED FIRM SURPLUS/DEFICIT	3469	3633	4114	3713	2498	4944	4935	4566	5298	5020	3238
1960 FED FIRM SURPLUS/DEFICIT	7126	5513	7726	8039	5823	5527	4896	4663	5546	5339	3225
1961 FED FIRM SURPLUS/DEFICIT	6381	3042	4283	4181	2284	3806	4896	4594	5372	5099	3302
1962 FED FIRM SURPLUS/DEFICIT	3544	4517	4258	3836	2838	3421	4882	4956	5904	5783	3650
1963 FED FIRM SURPLUS/DEFICIT	6033	4748	4120	4102	2292	5474	4903	5151	5339	5720	2408
1964 FED FIRM SURPLUS/DEFICIT	5682	4574	4593	3782	2552	3689	4920	4617	5425	5140	2505
1965 FED FIRM SURPLUS/DEFICIT	7443	5269	4133	4210	3181	5698	4924	4652	5437	5117	3317
1966 FED FIRM SURPLUS/DEFICIT	8229	7492	4414	3990	3163	4461	4897	5207	5700	5711	3311
1967 FED FIRM SURPLUS/DEFICIT	6516	3702	4215	3740	2906	3448	4919	4570	5355	5046	1938
1968 FED FIRM SURPLUS/DEFICIT	7994	5391	4376	3345	2545	4132	4927	4864	5954	4801	2094
1969 FED FIRM SURPLUS/DEFICIT	3642	5890	5990	5537	4619	5438	4911	4530	5342	5111	3359
1970 FED FIRM SURPLUS/DEFICIT	3803	2979	3006	3216	2396	3479	4886	5417	6422	5943	2600
1971 FED FIRM SURPLUS/DEFICIT	2951	2991	3105	2917	2417	3755	4905	4479	5288	4817	3097
1972 FED FIRM SURPLUS/DEFICIT	8596	5629	3029	2854	1928	4896	4909	4493	5376	5175	3045
1973 FED FIRM SURPLUS/DEFICIT	8578	7910	3027	3439	2689	4746	4594	3525	1715	1094	1283
1974 FED FIRM SURPLUS/DEFICIT	2946	2990	3013	2162	584	5542	4925	4844	5409	4962	2949
1975 FED FIRM SURPLUS/DEFICIT	8602	7063	3258	3377	2641	3042	4913	4671	5558	3997	3207
1976 FED FIRM SURPLUS/DEFICIT	4656	5670	3024	3899	4335	5680	4936	4538	5326	5067	3261
1977 FED FIRM SURPLUS/DEFICIT	8566	9098	7485	3848	2935	4042	1696	-208	998	2728	3145
1978 FED FIRM SURPLUS/DEFICIT	3076	3184	2926	2073	1445	3311	4853	4420	5369	4980	3201
***Less PP&L contract**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**
***Less cold weather adjustment**					**-1400**	**-1500**	**-1500**	**-1500**			
***Less SOR 5b reduction**	**-1100**	**-1100**	**-1400**	**-50**	**0**	**-500**	**-750**	**-600**	**-1600**	**-3400**	**-2800**
***Add replacement of firm energy deficit**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**
***Add firm capacity to meet Fed firm energy loads at C-E ratio of .83**	**900**	**900**	**900**	**900**	**900**	**900**	**900**	**900**	**900**	**900**	**900**
2003- 4											
OPERATING YEAR RUN											
DATE: 03/05/93 MEDIUM LOAD FORECAST											
PEAK IN MEGAWATTS	**AUG**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**	**JAN**	**FEB**	**MAR**	**APR**	**APR**
ADJUSTED	**1-15**	**16-31**								**1-15**	**16-30**
1929 FED FIRM SURPLUS/DEFICIT	**6783**	**3848**	**3595**	**4781**	**2387**	**2842**	**-225**	**-593**	**995**	**-730**	**975**
1930 FED FIRM SURPLUS/DEFICIT	**3661**	**3703**	**2700**	**3450**	**1945**	**1870**	**-507**	**-1772**	**651**	**21**	**877**
1931 FED FIRM SURPLUS/DEFICIT	**5806**	**4518**	**2667**	**3592**	**1848**	**2373**	**-569**	**-2067**	**-26**	**1792**	**103**

1932 FED FIRM SURPLUS/DEFICIT	2845	3475	2599	3096	705	1354	2470	3358	4559	2553	1
1933 FED FIRM SURPLUS/DEFICIT	5322	6043	4221	4818	2158	3153	3737	3520	4777	2492	1
1934 FED FIRM SURPLUS/DEFICIT	8458	7556	4065	5191	5241	4758	3755	3578	4886	2821	1
1935 FED FIRM SURPLUS/DEFICIT	4246	4129	4256	4513	2033	2855	3691	4162	3444	1686	1
1936 FED FIRM SURPLUS/DEFICIT	7246	3911	4239	4945	2926	3195	3336	1900	4544	2839	1
1937 FED FIRM SURPLUS/DEFICIT	3953	3773	3748	5059	3051	2839	-735	139	922	344	1
1938 FED FIRM SURPLUS/DEFICIT	2927	3141	2652	3153	-452	1568	3729	3497	4898	2663	1
1939 FED FIRM SURPLUS/DEFICIT	3450	3355	4190	5120	2738	2696	2006	-1493	5122	3664	2
1940 FED FIRM SURPLUS/DEFICIT	4943	3934	4075	5244	3122	2924	2487	-979	5310	4477	3
1941 FED FIRM SURPLUS/DEFICIT	4576	3931	2763	3712	2093	2373	267	539	1002	2475	1
1942 FED FIRM SURPLUS/DEFICIT	5496	5418	2642	3431	2328	4695	3702	4162	3105	3434	1
1943 FED FIRM SURPLUS/DEFICIT	6405	4480	4262	5095	2448	2945	3735	3590	4886	2831	1
1944 FED FIRM SURPLUS/DEFICIT	6750	3627	3837	4854	2838	2836	-560	-1071	-241	557	1
1945 FED FIRM SURPLUS/DEFICIT	3210	3054	2706	3205	943	1569	592	-716	1222	1503	
1946 FED FIRM SURPLUS/DEFICIT	2942	2992	2710	3217	1090	1260	3768	3583	4923	2549	1
1947 FED FIRM SURPLUS/DEFICIT	6582	4281	4199	4983	2292	4664	3764	3624	4979	2767	1
1948 FED FIRM SURPLUS/DEFICIT	5243	3318	3979	7249	4055	4467	3762	3580	4816	2707	1
1949 FED FIRM SURPLUS/DEFICIT	8150	7611	4246	4875	2674	3133	3740	3777	5161	3103	1
1950 FED FIRM SURPLUS/DEFICIT	2947	2995	2695	3213	747	2987	3759	3558	4843	2734	1
1951 FED FIRM SURPLUS/DEFICIT	8337	6882	3962	5954	4689	4810	3775	3601	4887	2793	1
1952 FED FIRM SURPLUS/DEFICIT	8410	4903	3568	6798	2347	4350	3736	3714	5062	3019	1
1953 FED FIRM SURPLUS/DEFICIT	5860	2992	3884	4895	3005	3098	3791	3650	4111	2231	1
1954 FED FIRM SURPLUS/DEFICIT	6267	5413	3888	4952	2232	2972	3766	3583	4809	2689	1
1955 FED FIRM SURPLUS/DEFICIT	8547	9005	6244	4865	2875	3964	3746	3986	4294	3288	
1956 FED FIRM SURPLUS/DEFICIT	7379	3613	3699	3796	3554	4803	3773	3568	4817	2689	1
1957 FED FIRM SURPLUS/DEFICIT	7023	5733	2699	3545	1569	4387	3745	3733	5123	3056	1
1958 FED FIRM SURPLUS/DEFICIT	3178	2992	3791	4920	2624	2772	3765	3765	5163	2833	1
1959 FED FIRM SURPLUS/DEFICIT	3469	3633	3814	4763	2198	4044	3785	3566	4798	2720	1
1960 FED FIRM SURPLUS/DEFICIT	7126	5513	7426	9089	5523	4627	3746	3663	5046	3039	1
1961 FED FIRM SURPLUS/DEFICIT	6381	3042	3983	5231	1984	2906	3746	3594	4872	2799	1
1962 FED FIRM SURPLUS/DEFICIT	3544	4517	3958	4886	2538	2521	3732	3956	5404	3483	1
1963 FED FIRM SURPLUS/DEFICIT	6033	4748	3820	5152	1992	4574	3753	4151	4839	3420	
1964 FED FIRM SURPLUS/DEFICIT	5682	4574	4293	4832	2252	2789	3770	3617	4925	2840	
1965 FED FIRM SURPLUS/DEFICIT	7443	5269	3833	5260	2881	4798	3774	3652	4937	2817	1
1966 FED FIRM SURPLUS/DEFICIT	8229	7492	4114	5040	2863	3561	3747	4207	5200	3411	1
1967 FED FIRM SURPLUS/DEFICIT	6516	3702	3915	4790	2606	2548	3769	3570	4855	2746	
1968 FED FIRM SURPLUS/DEFICIT	7994	5391	4076	4395	2245	3232	3777	3864	5454	2501	
1969 FED FIRM SURPLUS/DEFICIT	3642	5890	5690	6587	4319	4538	3761	3530	4842	2811	1
1970 FED FIRM SURPLUS/DEFICIT	3803	2979	2706	4266	2096	2579	3736	4417	5922	3643	
1971 FED FIRM SURPLUS/DEFICIT	2951	2991	2805	3967	2117	2855	3755	3479	4788	2517	1
1972 FED FIRM SURPLUS/DEFICIT	8596	5629	2729	3904	1628	3996	3759	3493	4876	2875	1
1973 FED FIRM SURPLUS/DEFICIT	8578	7910	2727	4489	2389	3846	3444	2525	1215	-1206	
1974 FED FIRM SURPLUS/DEFICIT	2946	2990	2713	3212	284	4642	3775	3844	4909	2662	1
1975 FED FIRM SURPLUS/DEFICIT	8602	7063	2958	4427	2341	2142	3763	3671	5058	1697	1
1976 FED FIRM SURPLUS/DEFICIT	4656	5670	2724	4949	4035	4780	3786	3538	4826	2767	1
1977 FED FIRM SURPLUS/DEFICIT	8566	9098	7185	4898	2635	3142	546	-1208	498	428	1
1978 FED FIRM SURPLUS/DEFICIT	3076	3184	2626	3123	1145	2411	3703	3420	4869	2680	1

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OPERATING YEAR
RUN DATE: 03/05/93 MEDIUM LOAD FORECAST

PEAK IN MEGAWATTS	AUG 1-15	AUG 16-31	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR 1-15	APR 16-30
1929 FED FIRM SURPLUS/DEFICIT	6694	3759	3804	3622	2538	3582	742	227	1332	1423	2526
1930 FED FIRM SURPLUS/DEFICIT	3573	3615	2908	2291	2096	2610	460	-951	988	2173	2428
1931 FED FIRM SURPLUS/DEFICIT	5717	4430	2875	2433	1999	3113	398	-1246	312	3944	1654
1932 FED FIRM SURPLUS/DEFICIT	2757	3386	2807	1938	856	2094	3437	4179	4897	4705	2909
1933 FED FIRM SURPLUS/DEFICIT	5233	5955	4430	3660	2309	3893	4704	4341	5115	4644	3044
1934 FED FIRM SURPLUS/DEFICIT	8370	7467	4274	4033	5392	5498	4722	4399	5223	4974	3243
1935 FED FIRM SURPLUS/DEFICIT	4157	4041	4465	3354	2184	3595	4658	4983	3781	3839	3303
1936 FED FIRM SURPLUS/DEFICIT	7157	3822	4448	3787	3078	3935	4303	2721	4882	4992	3400
1937 FED FIRM SURPLUS/DEFICIT	3864	3685	3957	3901	3203	3579	232	960	1259	2496	2696
1938 FED FIRM SURPLUS/DEFICIT	2839	3052	2860	1995	-300	2308	4696	4317	5236	4815	2967
1939 FED FIRM SURPLUS/DEFICIT	3362	3267	4399	3961	2889	3436	2973	-673	5459	5816	3916
1940 FED FIRM SURPLUS/DEFICIT	4855	3845	4284	4086	3273	3664	3455	-158	5647	6629	4693
1941 FED FIRM SURPLUS/DEFICIT	4487	3842	2972	2554	2245	3113	1234	1359	1339	4627	3336
1942 FED FIRM SURPLUS/DEFICIT	5407	5329	2850	2273	2479	5435	4669	4983	3442	5586	3277
1943 FED FIRM SURPLUS/DEFICIT	6317	4392	4470	3937	2599	3685	4702	4411	5223	4984	3184
1944 FED FIRM SURPLUS/DEFICIT	6662	3538	4046	3695	2990	3576	407	-250	96	2710	2802
1945 FED FIRM SURPLUS/DEFICIT	3122	2966	2914	2047	1094	2309	1559	105	1560	3655	1934
1946 FED FIRM SURPLUS/DEFICIT	2854	2903	2918	2059	1242	1999	4735	4404	5260	4701	3122
1947 FED FIRM SURPLUS/DEFICIT	6494	4193	4408	3824	2443	5404	4731	4445	5317	4919	3250
1948 FED FIRM SURPLUS/DEFICIT	5154	3229	4188	6091	4207	5206	4729	4401	5153	4859	2865
1949 FED FIRM SURPLUS/DEFICIT	8062	7522	4455	3717	2825	3873	4707	4597	5498	5256	3412
1950 FED FIRM SURPLUS/DEFICIT	2859	2906	2903	2055	899	3727	4726	4378	5180	4887	3051
1951 FED FIRM SURPLUS/DEFICIT	8249	6794	4171	4795	4840	5550	4742	4422	5225	4945	3146
1952 FED FIRM SURPLUS/DEFICIT	8322	4815	3777	5639	2498	5090	4703	4534	5400	5171	3370
1953 FED FIRM SURPLUS/DEFICIT	5771	2903	4093	3737	3156	3838	4758	4470	4449	4384	2947
1954 FED FIRM SURPLUS/DEFICIT	6178	5325	4097	3793	2383	3712	4733	4404	5147	4842	3018
1955 FED FIRM SURPLUS/DEFICIT	8459	8916	6453	3707	3027	4704	4713	4807	4632	5440	2029
1956 FED FIRM SURPLUS/DEFICIT	7291	3525	3908	2638	3705	5543	4740	4389	5154	4841	2890
1957 FED FIRM SURPLUS/DEFICIT	6935	5645	2908	2386	1720	5126	4712	4554	5460	5208	3394
1958 FED FIRM SURPLUS/DEFICIT	3089	2903	4000	3762	2775	3512	4732	4586	5501	4985	3145
1959 FED FIRM SURPLUS/DEFICIT	3380	3545	4023	3605	2349	4784	4752	4387	5136	4872	3090
1960 FED FIRM SURPLUS/DEFICIT	7037	5425	7635	7930	5674	5366	4713	4484	5384	5191	3076
1961 FED FIRM SURPLUS/DEFICIT	6293	2953	4192	4072	2135	3646	4713	4415	5209	4952	3154
1962 FED FIRM SURPLUS/DEFICIT	3456	4429	4167	3727	2690	3261	4699	4777	5741	5636	3501
1963 FED FIRM SURPLUS/DEFICIT	5944	4659	4028	3993	2143	5314	4720	4972	5177	5572	2259
1964 FED FIRM SURPLUS/DEFICIT	5593	4486	4502	3673	2403	3529	4737	4438	5263	4993	2357
1965 FED FIRM SURPLUS/DEFICIT	7355	5181	4042	4101	3032	5538	4741	4473	5274	4970	3169
1966 FED FIRM SURPLUS/DEFICIT	8140	7403	4322	3881	3015	4301	4714	5028	5538	5564	3162
1967 FED FIRM SURPLUS/DEFICIT	6427	3613	4124	3632	2757	3288	4736	4391	5192	4898	1789
1968 FED FIRM SURPLUS/DEFICIT	7905	5302	4285	3236	2397	3972	4744	4685	5792	4653	1946
1969 FED FIRM SURPLUS/DEFICIT	3553	5801	5899	5429	4470	5278	4728	4351	5180	4963	3210
1970 FED FIRM SURPLUS/DEFICIT	3715	2890	2915	3108	2247	3319	4703	5238	6260	5796	2452
1971 FED FIRM SURPLUS/DEFICIT	2863	2902	3014	2809	2269	3595	4722	4300	5125	4670	2948

1972 FED FIRM SURPLUS/DEFICIT	8508	5540	2938	2745	1779	4735	4726	4314	5214	5028	2
1973 FED FIRM SURPLUS/DEFICIT	8490	7822	2936	3331	2540	4586	4412	3345	1552	946	1
1974 FED FIRM SURPLUS/DEFICIT	2858	2901	2921	2054	435	5381	4742	4665	5247	4814	2
1975 FED FIRM SURPLUS/DEFICIT	8513	6974	3167	3268	2492	2882	4730	4492	5396	3849	3
1976 FED FIRM SURPLUS/DEFICIT	4567	5581	2933	3790	4186	5520	4753	4359	5164	4919	3
1977 FED FIRM SURPLUS/DEFICIT	8478	9010	7394	3740	2787	3882	1513	-387	835	2580	2
1978 FED FIRM SURPLUS/DEFICIT	2987	3095	2834	1965	1297	3150	4670	4241	5206	4832	3
***Less PP&L contract**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1**
***Less cold weather adjustment**					**-1400**	**-1500**	**-1500**	**-1500**			
***Less SOR 5b reduction**	**-1100**	**-1100**	**-1400**	**-50**	**0**	**-500**	**-750**	**-600**	**-1600**	**-3400**	**-2**
***Add replacement of firm energy deficit**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1**
***Add firm capacity to meet Fed firm energy loads at C-E ratio of .84**	**993**	**993**	**993**	**993**	**993**	**993**	**993**	**993**	**993**	**993**	

2004- 5
OPERATING YEAR RUN
DATE: 03/05/93 MEDIUM LOAD FORECAST

PEAK IN MEGAWATTS	**AUG 1-15**	**AUG 16-31**	**SEP**	**OCT**	**NOV**	**DEC**	**JAN**	**FEB**	**MAR**	**APR 1-15**	**1**
1929 FED FIRM SURPLUS/DEFICIT	**6787**	**3852**	**3597**	**4765**	**2331**	**2775**	**-315**	**-680**	**925**	**-784**	
1930 FED FIRM SURPLUS/DEFICIT	**3666**	**3708**	**2701**	**3434**	**1889**	**1803**	**-597**	**-1858**	**581**	**-34**	
1931 FED FIRM SURPLUS/DEFICIT	**5810**	**4523**	**2668**	**3576**	**1792**	**2306**	**-659**	**-2153**	**-95**	**1737**	
1932 FED FIRM SURPLUS/DEFICIT	**2850**	**3479**	**2600**	**3081**	**649**	**1287**	**2380**	**3272**	**4490**	**2498**	**1**
1933 FED FIRM SURPLUS/DEFICIT	**5326**	**6048**	**4223**	**4803**	**2102**	**3086**	**3647**	**3434**	**4708**	**2437**	**1**
1934 FED FIRM SURPLUS/DEFICIT	**8463**	**7560**	**4067**	**5176**	**5185**	**4691**	**3665**	**3492**	**4816**	**2767**	**1**
1935 FED FIRM SURPLUS/DEFICIT	**4250**	**4134**	**4258**	**4497**	**1977**	**2788**	**3601**	**4076**	**3374**	**1632**	**1**
1936 FED FIRM SURPLUS/DEFICIT	**7250**	**3915**	**4241**	**4930**	**2871**	**3128**	**3246**	**1814**	**4475**	**2785**	**1**
1937 FED FIRM SURPLUS/DEFICIT	**3957**	**3778**	**3750**	**5044**	**2996**	**2772**	**-825**	**53**	**852**	**289**	**1**
1938 FED FIRM SURPLUS/DEFICIT	**2932**	**3145**	**2653**	**3138**	**-507**	**1501**	**3639**	**3410**	**4829**	**2608**	**1**
1939 FED FIRM SURPLUS/DEFICIT	**3455**	**3360**	**4192**	**5104**	**2682**	**2629**	**1916**	**-1580**	**5052**	**3609**	**2**
1940 FED FIRM SURPLUS/DEFICIT	**4948**	**3938**	**4077**	**5229**	**3066**	**2857**	**2398**	**-1065**	**5240**	**4422**	**3**
1941 FED FIRM SURPLUS/DEFICIT	**4580**	**3935**	**2765**	**3697**	**2038**	**2306**	**177**	**452**	**932**	**2420**	**1**
1942 FED FIRM SURPLUS/DEFICIT	**5500**	**5422**	**2643**	**3416**	**2272**	**4628**	**3612**	**4076**	**3035**	**3379**	**1**
1943 FED FIRM SURPLUS/DEFICIT	**6410**	**4485**	**4263**	**5080**	**2392**	**2878**	**3645**	**3504**	**4816**	**2777**	**1**
1944 FED FIRM SURPLUS/DEFICIT	**6755**	**3631**	**3839**	**4838**	**2783**	**2769**	**-650**	**-1157**	**-311**	**503**	**1**
1945 FED FIRM SURPLUS/DEFICIT	**3215**	**3059**	**2707**	**3190**	**887**	**1502**	**502**	**-802**	**1153**	**1448**	
1946 FED FIRM SURPLUS/DEFICIT	**2947**	**2996**	**2711**	**3202**	**1035**	**1192**	**3678**	**3497**	**4853**	**2494**	**1**
1947 FED FIRM SURPLUS/DEFICIT	**6587**	**4286**	**4201**	**4967**	**2236**	**4597**	**3674**	**3538**	**4910**	**2712**	**1**
1948 FED FIRM SURPLUS/DEFICIT	**5247**	**3322**	**3981**	**7234**	**4000**	**4399**	**3672**	**3494**	**4746**	**2652**	**1**
1949 FED FIRM SURPLUS/DEFICIT	**8155**	**7615**	**4248**	**4860**	**2618**	**3066**	**3650**	**3690**	**5091**	**3049**	**1**
1950 FED FIRM SURPLUS/DEFICIT	**2952**	**2999**	**2696**	**3198**	**692**	**2920**	**3669**	**3471**	**4773**	**2680**	**1**
1951 FED FIRM SURPLUS/DEFICIT	**8342**	**6887**	**3964**	**5938**	**4633**	**4743**	**3685**	**3515**	**4818**	**2738**	**1**
1952 FED FIRM SURPLUS/DEFICIT	**8415**	**4908**	**3570**	**6782**	**2291**	**4283**	**3646**	**3627**	**4993**	**2964**	**1**
1953 FED FIRM SURPLUS/DEFICIT	**5864**	**2996**	**3886**	**4880**	**2949**	**3031**	**3701**	**3563**	**4042**	**2177**	**1**
1954 FED FIRM SURPLUS/DEFICIT	**6271**	**5418**	**3890**	**4936**	**2176**	**2905**	**3676**	**3497**	**4740**	**2635**	**1**
1955 FED FIRM SURPLUS/DEFICIT	**8552**	**9009**	**6246**	**4850**	**2820**	**3897**	**3656**	**3900**	**4225**	**3233**	
1956 FED FIRM SURPLUS/DEFICIT	**7384**	**3618**	**3701**	**3781**	**3498**	**4736**	**3683**	**3482**	**4747**	**2634**	**1**
1957 FED FIRM SURPLUS/DEFICIT	**7028**	**5738**	**2701**	**3529**	**1513**	**4319**	**3655**	**3647**	**5053**	**3001**	**1**
1958 FED FIRM SURPLUS/DEFICIT	**3182**	**2996**	**3793**	**4905**	**2568**	**2705**	**3675**	**3679**	**5094**	**2778**	**1**

1959 FED FIRM SURPLUS/DEFICIT	**3473**	**3638**	**3816**	**4748**	**2142**	**3977**	**3695**	**3480**	**4729**	**2665**	**1483**
1960 FED FIRM SURPLUS/DEFICIT	**7130**	**5518**	**7428**	**9073**	**5467**	**4559**	**3656**	**3577**	**4977**	**2984**	**1469**
1961 FED FIRM SURPLUS/DEFICIT	**6386**	**3046**	**3985**	**5215**	**1928**	**2839**	**3656**	**3508**	**4802**	**2745**	**1547**
1962 FED FIRM SURPLUS/DEFICIT	**3549**	**4522**	**3960**	**4870**	**2483**	**2454**	**3642**	**3870**	**5334**	**3429**	**1894**
1963 FED FIRM SURPLUS/DEFICIT	**6037**	**4752**	**3821**	**5136**	**1936**	**4507**	**3663**	**4065**	**4770**	**3365**	**652**
1964 FED FIRM SURPLUS/DEFICIT	**5686**	**4579**	**4295**	**4816**	**2196**	**2722**	**3680**	**3531**	**4856**	**2786**	**750**
1965 FED FIRM SURPLUS/DEFICIT	**7448**	**5274**	**3835**	**5244**	**2825**	**4731**	**3684**	**3566**	**4867**	**2763**	**1562**
1966 FED FIRM SURPLUS/DEFICIT	**8233**	**7496**	**4115**	**5024**	**2808**	**3494**	**3657**	**4121**	**5131**	**3357**	**1555**
1967 FED FIRM SURPLUS/DEFICIT	**6520**	**3706**	**3917**	**4775**	**2550**	**2481**	**3679**	**3484**	**4785**	**2691**	**182**
1968 FED FIRM SURPLUS/DEFICIT	**7998**	**5395**	**4078**	**4379**	**2190**	**3165**	**3687**	**3778**	**5385**	**2446**	**339**
1969 FED FIRM SURPLUS/DEFICIT	**3646**	**5894**	**5692**	**6572**	**4263**	**4471**	**3671**	**3444**	**4773**	**2756**	**1603**
1970 FED FIRM SURPLUS/DEFICIT	**3808**	**2983**	**2708**	**4251**	**2040**	**2512**	**3646**	**4331**	**5853**	**3589**	**845**
1971 FED FIRM SURPLUS/DEFICIT	**2956**	**2995**	**2807**	**3952**	**2062**	**2788**	**3665**	**3393**	**4718**	**2463**	**1341**
1972 FED FIRM SURPLUS/DEFICIT	**8601**	**5633**	**2731**	**3888**	**1572**	**3928**	**3669**	**3407**	**4807**	**2821**	**1290**
1973 FED FIRM SURPLUS/DEFICIT	**8583**	**7915**	**2729**	**4474**	**2333**	**3779**	**3355**	**2438**	**1145**	**-1261**	**-473**
1974 FED FIRM SURPLUS/DEFICIT	**2951**	**2994**	**2714**	**3197**	**228**	**4574**	**3685**	**3758**	**4840**	**2607**	**1194**
1975 FED FIRM SURPLUS/DEFICIT	**8606**	**7067**	**2960**	**4411**	**2285**	**2075**	**3673**	**3585**	**4989**	**1642**	**1451**
1976 FED FIRM SURPLUS/DEFICIT	**4660**	**5674**	**2726**	**4933**	**3979**	**4713**	**3696**	**3452**	**4757**	**2712**	**1505**
1977 FED FIRM SURPLUS/DEFICIT	**8571**	**9103**	**7187**	**4883**	**2580**	**3075**	**456**	**-1294**	**428**	**373**	**1390**
1978 FED FIRM SURPLUS/DEFICIT	**3080**	**3188**	**2627**	**3108**	**1090**	**2343**	**3613**	**3334**	**4799**	**2625**	**1445**

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OPERATING YEAR
RUN DATE: 03/05/93 MEDIUM LOAD FORECAST

PEAK IN MEGAWATTS	AUG 1-15	AUG 16-31	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR 1-15	APR 16-30
1929 FED FIRM SURPLUS/DEFICIT	6614	3679	3718	3504	2155	3174	322	-185	944	1042	2144
1930 FED FIRM SURPLUS/DEFICIT	3493	3535	2822	2173	1713	2202	40	-1364	600	1793	2047
1931 FED FIRM SURPLUS/DEFICIT	5637	4350	2789	2315	1616	2704	-22	-1659	-76	3564	1272
1932 FED FIRM SURPLUS/DEFICIT	2677	3306	2721	1820	473	1686	3016	3766	4509	4324	2527
1933 FED FIRM SURPLUS/DEFICIT	5153	5875	4344	3541	1925	3485	4283	3928	4727	4264	2663
1934 FED FIRM SURPLUS/DEFICIT	8290	7387	4188	3914	5009	5089	4301	3986	4835	4593	2861
1935 FED FIRM SURPLUS/DEFICIT	4077	3961	4379	3236	1801	3187	4237	4571	3393	3458	2921
1936 FED FIRM SURPLUS/DEFICIT	7077	3742	4362	3668	2694	3527	3882	2308	4494	4611	3018
1937 FED FIRM SURPLUS/DEFICIT	3784	3605	3871	3782	2819	3171	-188	547	872	2115	2314
1938 FED FIRM SURPLUS/DEFICIT	2759	2972	2774	1877	-684	1900	4276	3905	4848	4434	2586
1939 FED FIRM SURPLUS/DEFICIT	3282	3187	4313	3843	2506	3027	2553	-1085	5072	5435	3534
1940 FED FIRM SURPLUS/DEFICIT	4775	3765	4198	3967	2889	3256	3034	-571	5259	6249	4311
1941 FED FIRM SURPLUS/DEFICIT	4407	3762	2886	2435	1861	2705	813	947	952	4246	2955
1942 FED FIRM SURPLUS/DEFICIT	5327	5249	2764	2155	2096	5026	4249	4570	3054	5205	2895
1943 FED FIRM SURPLUS/DEFICIT	6237	4312	4384	3819	2216	3277	4281	3999	4835	4602	2802
1944 FED FIRM SURPLUS/DEFICIT	6582	3459	3960	3577	2606	3167	-14	-663	-292	2329	2420
1945 FED FIRM SURPLUS/DEFICIT	3042	2886	2828	1929	711	1900	1139	-308	1172	3275	1553
1946 FED FIRM SURPLUS/DEFICIT	2774	2823	2832	1941	858	1591	4315	3992	4872	4321	2740
1947 FED FIRM SURPLUS/DEFICIT	6414	4113	4322	3706	2060	4995	4310	4032	4929	4538	2869
1948 FED FIRM SURPLUS/DEFICIT	5074	3149	4102	5972	3823	4798	4308	3988	4766	4478	2483
1949 FED FIRM SURPLUS/DEFICIT	7982	7442	4369	3599	2442	3464	4286	4185	5110	4875	3030
1950 FED FIRM SURPLUS/DEFICIT	2779	2826	2817	1937	515	3318	4305	3966	4793	4506	2670
1951 FED FIRM SURPLUS/DEFICIT	8169	6714	4085	4677	4457	5141	4321	4009	4837	4564	2764

1952 FED FIRM SURPLUS/DEFICIT	8242	4735	3691	5521	2115	4681	4282	4121	5012	4791	2
1953 FED FIRM SURPLUS/DEFICIT	5692	2823	4007	3618	2773	3430	4337	4058	4061	4003	2
1954 FED FIRM SURPLUS/DEFICIT	6099	5245	4011	3675	2000	3303	4312	3992	4759	4461	2
1955 FED FIRM SURPLUS/DEFICIT	8379	8836	6367	3589	2643	4296	4293	4395	4244	5060	1
1956 FED FIRM SURPLUS/DEFICIT	7211	3445	3821	2519	3322	5134	4319	3976	4767	4461	2
1957 FED FIRM SURPLUS/DEFICIT	6855	5565	2822	2268	1337	4718	4291	4140	5072	4828	3
1958 FED FIRM SURPLUS/DEFICIT	3009	2823	3914	3644	2392	3104	4311	4173	5113	4604	2
1959 FED FIRM SURPLUS/DEFICIT	3300	3465	3937	3487	1966	4375	4331	3975	4748	4491	2
1960 FED FIRM SURPLUS/DEFICIT	6958	5345	7549	7812	5291	4958	4292	4071	4996	4810	2
1961 FED FIRM SURPLUS/DEFICIT	6213	2873	4106	3954	1752	3237	4293	4002	4821	4571	2
1962 FED FIRM SURPLUS/DEFICIT	3376	4349	4081	3609	2306	2853	4279	4363	5354	5255	3
1963 FED FIRM SURPLUS/DEFICIT	5864	4579	3942	3875	1760	4906	4299	4560	4789	5191	1
1964 FED FIRM SURPLUS/DEFICIT	5513	4406	4416	3555	2020	3121	4317	4025	4875	4612	1
1965 FED FIRM SURPLUS/DEFICIT	7275	5101	3956	3983	2649	5130	4320	4060	4887	4589	2
1966 FED FIRM SURPLUS/DEFICIT	8060	7323	4236	3763	2631	3892	4294	4615	5150	5183	2
1967 FED FIRM SURPLUS/DEFICIT	6347	3533	4038	3514	2374	2880	4315	3978	4805	4518	1
1968 FED FIRM SURPLUS/DEFICIT	7825	5222	4199	3118	2013	3563	4323	4273	5404	4272	1
1969 FED FIRM SURPLUS/DEFICIT	3473	5722	5813	5311	4087	4869	4307	3938	4792	4583	2
1970 FED FIRM SURPLUS/DEFICIT	3635	2810	2829	2990	1864	2910	4282	4825	5872	5415	2
1971 FED FIRM SURPLUS/DEFICIT	2783	2822	2928	2690	1885	3186	4302	3887	4737	4289	2
1972 FED FIRM SURPLUS/DEFICIT	8428	5460	2852	2627	1396	4327	4305	3901	4826	4647	2
1973 FED FIRM SURPLUS/DEFICIT	8410	7742	2850	3213	2157	4177	3991	2933	1164	565	
1974 FED FIRM SURPLUS/DEFICIT	2778	2821	2835	1936	52	4973	4322	4253	4859	4435	2
1975 FED FIRM SURPLUS/DEFICIT	8434	6895	3080	3150	2108	2474	4310	4079	5008	3468	2
1976 FED FIRM SURPLUS/DEFICIT	4487	5501	2847	3672	3803	5111	4332	3947	4776	4539	2
1977 FED FIRM SURPLUS/DEFICIT	8398	8930	7308	3622	2403	3473	1093	-800	447	2200	2
1978 FED FIRM SURPLUS/DEFICIT	2907	3015	2748	1847	913	2742	4249	3828	4818	4452	2
***Less PP&L contract**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1**
***Less cold weather adjustment**					**-1400**	**-1500**	**-1500**	**-1500**			
***Less SOR 5b reduction**	**-1100**	**-1100**	**-1400**	**-50**	**0**	**-500**	**-750**	**-600**	**-1600**	**-3400**	**-2**
***Add replacement of firm energy deficit**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1**
***Add firm capacity to meet Fed firm energy loads at C-E ratio at .85**	**1169**	**1169**	**1169**	**1169**	**1169**	**1169**	**1169**	**1169**	**1169**	**1169**	**1**

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OPERATING YEAR RUN

DATE: 03/05/93 MEDIUM LOAD FORECAST

PEAK IN MEGAWATTS	**AUG 1-15**	**AUG 16-31**	**SEP**	**OCT**	**NOV**	**DEC**	**JAN**	**FEB**	**MAR**	**APR 1-15**	**1**
1929 FED FIRM SURPLUS/DEFICIT	**6883**	**3948**	**3687**	**4823**	**2124**	**2543**	**-559**	**-916**	**713**	**-989**	
1930 FED FIRM SURPLUS/DEFICIT	**3762**	**3804**	**2791**	**3492**	**1682**	**1571**	**-841**	**-2095**	**369**	**-238**	
1931 FED FIRM SURPLUS/DEFICIT	**5906**	**4619**	**2758**	**3634**	**1585**	**2073**	**-903**	**-2390**	**-307**	**1533**	
1932 FED FIRM SURPLUS/DEFICIT	**2946**	**3575**	**2690**	**3139**	**442**	**1055**	**2135**	**3035**	**4278**	**2293**	**1**
1933 FED FIRM SURPLUS/DEFICIT	**5422**	**6144**	**4313**	**4860**	**1894**	**2854**	**3402**	**3197**	**4496**	**2233**	**1**
1934 FED FIRM SURPLUS/DEFICIT	**8559**	**7656**	**4157**	**5233**	**4978**	**4458**	**3420**	**3255**	**4604**	**2562**	**1**
1935 FED FIRM SURPLUS/DEFICIT	**4346**	**4230**	**4348**	**4555**	**1770**	**2556**	**3356**	**3840**	**3162**	**1427**	**1**
1936 FED FIRM SURPLUS/DEFICIT	**7346**	**4011**	**4331**	**4987**	**2663**	**2896**	**3001**	**1577**	**4263**	**2580**	**1**
1937 FED FIRM SURPLUS/DEFICIT	**4053**	**3874**	**3840**	**5101**	**2788**	**2540**	**-1069**	**-184**	**641**	**84**	

1938 FED FIRM SURPLUS/DEFICIT	**3028**	**3241**	**2743**	**3196**	**-715**	**1269**	**3395**	**3174**	**4617**	**2403**	**1155**
1939 FED FIRM SURPLUS/DEFICIT	**3551**	**3456**	**4282**	**5162**	**2475**	**2396**	**1672**	**-1816**	**4841**	**3404**	**2103**
1940 FED FIRM SURPLUS/DEFICIT	**5044**	**4034**	**4167**	**5286**	**2858**	**2625**	**2153**	**-1302**	**5028**	**4218**	**2880**
1941 FED FIRM SURPLUS/DEFICIT	**4676**	**4031**	**2855**	**3754**	**1830**	**2074**	**-68**	**216**	**721**	**2215**	**1524**
1942 FED FIRM SURPLUS/DEFICIT	**5596**	**5518**	**2733**	**3474**	**2065**	**4395**	**3368**	**3839**	**2823**	**3174**	**1464**
1943 FED FIRM SURPLUS/DEFICIT	**6506**	**4581**	**4353**	**5138**	**2185**	**2646**	**3400**	**3268**	**4604**	**2571**	**1371**
1944 FED FIRM SURPLUS/DEFICIT	**6851**	**3728**	**3929**	**4896**	**2575**	**2536**	**-895**	**-1394**	**-523**	**298**	**989**
1945 FED FIRM SURPLUS/DEFICIT	**3311**	**3155**	**2797**	**3248**	**680**	**1269**	**258**	**-1039**	**941**	**1244**	**122**
1946 FED FIRM SURPLUS/DEFICIT	**3043**	**3092**	**2801**	**3260**	**827**	**960**	**3434**	**3261**	**4641**	**2290**	**1309**
1947 FED FIRM SURPLUS/DEFICIT	**6683**	**4382**	**4291**	**5025**	**2029**	**4364**	**3429**	**3301**	**4698**	**2507**	**1438**
1948 FED FIRM SURPLUS/DEFICIT	**5343**	**3418**	**4071**	**7291**	**3792**	**4167**	**3427**	**3257**	**4535**	**2447**	**1052**
1949 FED FIRM SURPLUS/DEFICIT	**8251**	**7711**	**4338**	**4918**	**2411**	**2833**	**3405**	**3454**	**4879**	**2844**	**1599**
1950 FED FIRM SURPLUS/DEFICIT	**3048**	**3095**	**2786**	**3256**	**484**	**2687**	**3424**	**3235**	**4562**	**2475**	**1239**
1951 FED FIRM SURPLUS/DEFICIT	**8438**	**6983**	**4054**	**5996**	**4426**	**4510**	**3440**	**3278**	**4606**	**2533**	**1333**
1952 FED FIRM SURPLUS/DEFICIT	**8511**	**5004**	**3660**	**6840**	**2084**	**4050**	**3401**	**3390**	**4781**	**2760**	**1558**
1953 FED FIRM SURPLUS/DEFICIT	**5961**	**3092**	**3976**	**4937**	**2742**	**2799**	**3456**	**3327**	**3830**	**1972**	**1134**
1954 FED FIRM SURPLUS/DEFICIT	**6368**	**5514**	**3980**	**4994**	**1969**	**2672**	**3431**	**3261**	**4528**	**2430**	**1205**
1955 FED FIRM SURPLUS/DEFICIT	**8648**	**9105**	**6336**	**4908**	**2612**	**3665**	**3412**	**3664**	**4013**	**3029**	**217**
1956 FED FIRM SURPLUS/DEFICIT	**7480**	**3714**	**3790**	**3838**	**3291**	**4503**	**3438**	**3245**	**4536**	**2430**	**1077**
1957 FED FIRM SURPLUS/DEFICIT	**7124**	**5834**	**2791**	**3587**	**1306**	**4087**	**3410**	**3409**	**4841**	**2797**	**1581**
1958 FED FIRM SURPLUS/DEFICIT	**3278**	**3092**	**3883**	**4963**	**2361**	**2473**	**3430**	**3442**	**4882**	**2573**	**1332**
1959 FED FIRM SURPLUS/DEFICIT	**3569**	**3734**	**3906**	**4806**	**1935**	**3744**	**3450**	**3244**	**4517**	**2460**	**1277**
1960 FED FIRM SURPLUS/DEFICIT	**7227**	**5614**	**7518**	**9131**	**5260**	**4327**	**3411**	**3340**	**4765**	**2779**	**1263**
1961 FED FIRM SURPLUS/DEFICIT	**6482**	**3142**	**4075**	**5273**	**1721**	**2606**	**3412**	**3271**	**4590**	**2540**	**1341**
1962 FED FIRM SURPLUS/DEFICIT	**3645**	**4618**	**4050**	**4928**	**2275**	**2222**	**3398**	**3632**	**5123**	**3224**	**1688**
1963 FED FIRM SURPLUS/DEFICIT	**6133**	**4848**	**3911**	**5194**	**1729**	**4275**	**3418**	**3829**	**4558**	**3160**	**447**
1964 FED FIRM SURPLUS/DEFICIT	**5782**	**4675**	**4385**	**4874**	**1989**	**2490**	**3436**	**3294**	**4644**	**2581**	**544**
1965 FED FIRM SURPLUS/DEFICIT	**7544**	**5370**	**3925**	**5302**	**2618**	**4499**	**3439**	**3329**	**4656**	**2558**	**1356**
1966 FED FIRM SURPLUS/DEFICIT	**8329**	**7592**	**4205**	**5082**	**2600**	**3261**	**3413**	**3884**	**4919**	**3152**	**1349**
1967 FED FIRM SURPLUS/DEFICIT	**6616**	**3802**	**4007**	**4833**	**2343**	**2249**	**3434**	**3247**	**4574**	**2487**	**-23**
1968 FED FIRM SURPLUS/DEFICIT	**8094**	**5491**	**4168**	**4437**	**1982**	**2932**	**3442**	**3542**	**5173**	**2241**	**133**
1969 FED FIRM SURPLUS/DEFICIT	**3742**	**5991**	**5782**	**6630**	**4056**	**4238**	**3426**	**3207**	**4561**	**2552**	**1398**
1970 FED FIRM SURPLUS/DEFICIT	**3904**	**3079**	**2798**	**4309**	**1833**	**2279**	**3401**	**4094**	**5641**	**3384**	**639**
1971 FED FIRM SURPLUS/DEFICIT	**3052**	**3091**	**2897**	**4009**	**1854**	**2555**	**3421**	**3156**	**4506**	**2258**	**1136**
1972 FED FIRM SURPLUS/DEFICIT	**8697**	**5729**	**2821**	**3946**	**1365**	**3696**	**3424**	**3170**	**4595**	**2616**	**1084**
1973 FED FIRM SURPLUS/DEFICIT	**8679**	**8011**	**2819**	**4532**	**2126**	**3546**	**3110**	**2202**	**933**	**-1466**	**-679**
1974 FED FIRM SURPLUS/DEFICIT	**3047**	**3090**	**2804**	**3255**	**21**	**4342**	**3441**	**3522**	**4628**	**2404**	**988**
1975 FED FIRM SURPLUS/DEFICIT	**8703**	**7164**	**3049**	**4469**	**2077**	**1843**	**3429**	**3348**	**4777**	**1437**	**1246**
1976 FED FIRM SURPLUS/DEFICIT	**4756**	**5770**	**2816**	**4991**	**3772**	**4480**	**3451**	**3216**	**4545**	**2508**	**1300**
1977 FED FIRM SURPLUS/DEFICIT	**8667**	**9199**	**7277**	**4941**	**2372**	**2842**	**212**	**-1531**	**216**	**169**	**1184**
1978 FED FIRM SURPLUS/DEFICIT	**3176**	**3284**	**2717**	**3166**	**882**	**2111**	**3368**	**3097**	**4587**	**2421**	**1240**

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OPERATING YEAR
RUN DATE: 03/05/93 MEDIUM LOAD FORECAST

PEAK IN MEGAWATTS	AUG 1-15	AUG 16-31	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR 1-15	APR 16-30
1929 FED FIRM SURPLUS/DEFICIT	6314	3417	3451	3139	1986	2993	147	-346	790	901	2002
1930 FED FIRM SURPLUS/DEFICIT	3192	3272	2555	1808	1544	2021	-135	-1525	446	1652	1905

1931 FED FIRM SURPLUS/DEFICIT	5337	4087	2522	1950	1447	2524	-197	-1820	-230	3422	1
1932 FED FIRM SURPLUS/DEFICIT	2376	3043	2454	1454	304	1505	2842	3605	4355	4183	2
1933 FED FIRM SURPLUS/DEFICIT	4852	5612	4076	3176	1756	3304	4109	3768	4573	4122	2
1934 FED FIRM SURPLUS/DEFICIT	7989	7124	3921	3549	4840	4909	4127	3825	4681	4452	2
1935 FED FIRM SURPLUS/DEFICIT	3777	3698	4111	2871	1632	3006	4063	4410	3239	3317	2
1936 FED FIRM SURPLUS/DEFICIT	6776	3479	4095	3303	2525	3346	3708	2148	4340	4470	2
1937 FED FIRM SURPLUS/DEFICIT	3484	3342	3604	3417	2650	2990	-363	387	717	1974	2
1938 FED FIRM SURPLUS/DEFICIT	2458	2710	2507	1511	-853	1719	4101	3744	4694	4293	2
1939 FED FIRM SURPLUS/DEFICIT	2981	2924	4046	3478	2337	2847	2378	-1246	4917	5294	3
1940 FED FIRM SURPLUS/DEFICIT	4474	3503	3931	3602	2720	3076	2860	-732	5105	6108	4
1941 FED FIRM SURPLUS/DEFICIT	4107	3499	2619	2070	1692	2524	639	786	797	4105	2
1942 FED FIRM SURPLUS/DEFICIT	5027	4986	2497	1790	1927	4846	4074	4409	2900	5064	2
1943 FED FIRM SURPLUS/DEFICIT	5936	4049	4117	3453	2047	3097	4107	3838	4681	4461	2
1944 FED FIRM SURPLUS/DEFICIT	6281	3196	3693	3212	2437	2987	-188	-824	-446	2188	2
1945 FED FIRM SURPLUS/DEFICIT	2741	2623	2561	1563	542	1720	964	-469	1018	3133	1
1946 FED FIRM SURPLUS/DEFICIT	2473	2561	2565	1575	689	1411	4140	3830	4718	4180	2
1947 FED FIRM SURPLUS/DEFICIT	6113	3850	4055	3341	1891	4815	4136	3872	4774	4397	2
1948 FED FIRM SURPLUS/DEFICIT	4774	2886	3834	5607	3654	4618	4134	3827	4611	4337	2
1949 FED FIRM SURPLUS/DEFICIT	7681	7179	4101	3234	2273	3284	4112	4024	4956	4734	2
1950 FED FIRM SURPLUS/DEFICIT	2478	2564	2550	1571	346	3138	4131	3805	4638	4365	2
1951 FED FIRM SURPLUS/DEFICIT	7868	6451	3818	4312	4288	4961	4147	3848	4683	4423	2
1952 FED FIRM SURPLUS/DEFICIT	7941	4472	3423	5156	1946	4501	4108	3960	4858	4650	2
1953 FED FIRM SURPLUS/DEFICIT	5391	2561	3740	3253	2604	3250	4163	3897	3907	3862	2
1954 FED FIRM SURPLUS/DEFICIT	5798	4982	3744	3310	1831	3123	4138	3831	4605	4320	2
1955 FED FIRM SURPLUS/DEFICIT	8078	8574	6100	3223	2474	4115	4118	4234	4090	4918	1
1956 FED FIRM SURPLUS/DEFICIT	6910	3182	3554	2154	3153	4954	4145	3815	4612	4319	2
1957 FED FIRM SURPLUS/DEFICIT	6554	5302	2555	1903	1168	4538	4117	3979	4918	4687	2
1958 FED FIRM SURPLUS/DEFICIT	2709	2561	3647	3279	2223	2923	4137	4012	4959	4463	2
1959 FED FIRM SURPLUS/DEFICIT	3000	3202	3670	3121	1797	4195	4157	3814	4594	4350	2
1960 FED FIRM SURPLUS/DEFICIT	6657	5082	7282	7447	5122	4778	4118	3910	4842	4669	2
1961 FED FIRM SURPLUS/DEFICIT	5912	2610	3839	3589	1583	3057	4118	3841	4667	4430	2
1962 FED FIRM SURPLUS/DEFICIT	3075	4086	3814	3244	2137	2672	4104	4202	5199	5114	2
1963 FED FIRM SURPLUS/DEFICIT	5563	4317	3675	3510	1591	4726	4125	4399	4635	5050	1
1964 FED FIRM SURPLUS/DEFICIT	5213	4143	4149	3190	1851	2940	4142	3864	4721	4471	1
1965 FED FIRM SURPLUS/DEFICIT	6974	4838	3689	3618	2480	4949	4146	3899	4732	4448	2
1966 FED FIRM SURPLUS/DEFICIT	7760	7061	3969	3398	2462	3712	4119	4454	4996	5042	2
1967 FED FIRM SURPLUS/DEFICIT	6047	3270	3771	3148	2205	2699	4141	3818	4650	4376	1
1968 FED FIRM SURPLUS/DEFICIT	7525	4959	3932	2753	1844	3383	4149	4112	5250	4131	1
1969 FED FIRM SURPLUS/DEFICIT	3173	5459	5545	4946	3918	4689	4133	3778	4638	4441	2
1970 FED FIRM SURPLUS/DEFICIT	3334	2548	2562	2624	1695	2730	4108	4665	5718	5274	1
1971 FED FIRM SURPLUS/DEFICIT	2482	2560	2660	2325	1716	3006	4127	3726	4583	4148	2
1972 FED FIRM SURPLUS/DEFICIT	8127	5197	2585	2262	1227	4147	4131	3741	4672	4506	2
1973 FED FIRM SURPLUS/DEFICIT	8109	7479	2583	2847	1988	3997	3817	2772	1010	424	
1974 FED FIRM SURPLUS/DEFICIT	2477	2559	2568	1570	-117	4793	4147	4092	4705	4294	2
1975 FED FIRM SURPLUS/DEFICIT	8133	6632	2813	2785	1939	2293	4135	3918	4854	3327	2
1976 FED FIRM SURPLUS/DEFICIT	4187	5238	2580	3307	3634	4931	4158	3786	4622	4398	2
1977 FED FIRM SURPLUS/DEFICIT	8097	8667	7041	3257	2234	3293	918	-960	293	2059	2
1978 FED FIRM SURPLUS/DEFICIT	2607	2753	2481	1481	744	2562	4075	3668	4664	4311	2

*Less PP&L contract	-1100	-1100	-1100	-1100	-1100	-1100	-1100	-1100	-1100	-1100	-1100
*Less cold weather adjustment					-1400	-1500	-1500	-1500			
*Less SOR 5b reduction	-1100	-1100	-1400	-50	0	-500	-750	-600	-1600	-3400	-2800
*Add replacement of firm energy deficit	1300	1300	1300	1300	1300	1300	1300	1300	1300	1300	1300
*Add firm capacity to meet Fed firm energy loads at C-E ratio of .86	1293	1293	1293	1293	1293	1293	1293	1293	1293	1293	1293
2006- 7											
OPERATING YEAR RUN											
DATE: 03/05/93 MEDIUM LOAD FORECAST											
PEAK IN MEGAWATTS	AUG	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	APR
ADJUSTED	1-15	16-31								1-15	16-30
1929 FED FIRM SURPLUS/DEFICIT	6707	3810	3544	4582	2079	2486	-610	-953	683	-1006	695
1930 FED FIRM SURPLUS/DEFICIT	3585	3665	2648	3251	1637	1514	-892	-2132	339	-255	598
1931 FED FIRM SURPLUS/DEFICIT	5730	4480	2615	3393	1540	2017	-954	-2427	-337	1515	-177
1932 FED FIRM SURPLUS/DEFICIT	2769	3436	2547	2897	397	998	2085	2998	4248	2276	1078
1933 FED FIRM SURPLUS/DEFICIT	5245	6005	4169	4619	1849	2797	3352	3161	4466	2215	1214
1934 FED FIRM SURPLUS/DEFICIT	8382	7517	4014	4992	4933	4402	3370	3218	4574	2545	1412
1935 FED FIRM SURPLUS/DEFICIT	4170	4091	4204	4314	1725	2499	3306	3803	3132	1410	1472
1936 FED FIRM SURPLUS/DEFICIT	7169	3872	4188	4746	2618	2839	2951	1541	4233	2563	1569
1937 FED FIRM SURPLUS/DEFICIT	3877	3735	3697	4860	2743	2483	-1120	-220	610	67	865
1938 FED FIRM SURPLUS/DEFICIT	2851	3103	2600	2954	-760	1212	3344	3137	4587	2386	1137
1939 FED FIRM SURPLUS/DEFICIT	3374	3317	4139	4921	2430	2340	1621	-1853	4810	3387	2085
1940 FED FIRM SURPLUS/DEFICIT	4867	3896	4024	5045	2813	2569	2103	-1339	4998	4201	2862
1941 FED FIRM SURPLUS/DEFICIT	4500	3892	2712	3513	1785	2017	-118	179	690	2198	1506
1942 FED FIRM SURPLUS/DEFICIT	5420	5379	2590	3233	2020	4339	3317	3802	2793	3157	1446
1943 FED FIRM SURPLUS/DEFICIT	6329	4442	4210	4896	2140	2590	3350	3231	4574	2554	1353
1944 FED FIRM SURPLUS/DEFICIT	6674	3589	3786	4655	2530	2480	-945	-1431	-553	281	971
1945 FED FIRM SURPLUS/DEFICIT	3134	3016	2654	3006	635	1213	207	-1076	911	1226	104
1946 FED FIRM SURPLUS/DEFICIT	2866	2954	2658	3018	782	904	3383	3223	4611	2273	1291
1947 FED FIRM SURPLUS/DEFICIT	6506	4243	4148	4784	1984	4308	3379	3265	4667	2490	1420
1948 FED FIRM SURPLUS/DEFICIT	5167	3279	3927	7050	3747	4111	3377	3220	4504	2430	1034
1949 FED FIRM SURPLUS/DEFICIT	8074	7572	4194	4677	2366	2777	3355	3417	4849	2827	1581
1950 FED FIRM SURPLUS/DEFICIT	2871	2957	2643	3014	439	2631	3374	3198	4531	2458	1221
1951 FED FIRM SURPLUS/DEFICIT	8261	6844	3911	5755	4381	4454	3390	3241	4576	2516	1315
1952 FED FIRM SURPLUS/DEFICIT	8334	4865	3516	6599	2039	3994	3351	3353	4751	2743	1540
1953 FED FIRM SURPLUS/DEFICIT	5784	2954	3833	4696	2697	2743	3406	3290	3800	1955	1116
1954 FED FIRM SURPLUS/DEFICIT	6191	5375	3837	4753	1924	2616	3381	3224	4498	2413	1187
1955 FED FIRM SURPLUS/DEFICIT	8471	8967	6193	4666	2567	3608	3361	3627	3983	3011	199
1956 FED FIRM SURPLUS/DEFICIT	7303	3575	3647	3597	3246	4447	3388	3208	4505	2412	1059
1957 FED FIRM SURPLUS/DEFICIT	6947	5695	2648	3346	1261	4031	3360	3372	4811	2780	1563
1958 FED FIRM SURPLUS/DEFICIT	3102	2954	3740	4722	2316	2416	3380	3405	4852	2556	1314
1959 FED FIRM SURPLUS/DEFICIT	3393	3595	3763	4564	1890	3688	3400	3207	4487	2443	1259
1960 FED FIRM SURPLUS/DEFICIT	7050	5475	7375	8890	5215	4271	3361	3303	4735	2762	1245
1961 FED FIRM SURPLUS/DEFICIT	6305	3003	3932	5032	1676	2550	3361	3234	4560	2523	1323
1962 FED FIRM SURPLUS/DEFICIT	3468	4479	3907	4687	2230	2165	3347	3595	5092	3207	1670
1963 FED FIRM SURPLUS/DEFICIT	5956	4710	3768	4953	1684	4219	3368	3792	4528	3143	429
1964 FED FIRM SURPLUS/DEFICIT	5606	4536	4242	4633	1944	2433	3385	3257	4614	2564	526
1965 FED FIRM SURPLUS/DEFICIT	7367	5231	3782	5061	2573	4442	3389	3292	4625	2541	1338
1966 FED FIRM SURPLUS/DEFICIT	8153	7454	4062	4841	2555	3205	3362	3847	4889	3135	1331

1967 FED FIRM SURPLUS/DEFICIT	**6440**	**3663**	**3864**	**4591**	**2298**	**2192**	**3384**	**3211**	**4543**	**2469**	
1968 FED FIRM SURPLUS/DEFICIT	**7918**	**5352**	**4025**	**4196**	**1937**	**2876**	**3392**	**3505**	**5143**	**2224**	
1969 FED FIRM SURPLUS/DEFICIT	**3566**	**5852**	**5638**	**6389**	**4011**	**4182**	**3376**	**3171**	**4531**	**2534**	1
1970 FED FIRM SURPLUS/DEFICIT	**3727**	**2941**	**2655**	**4067**	**1788**	**2223**	**3351**	**4058**	**5611**	**3367**	
1971 FED FIRM SURPLUS/DEFICIT	**2875**	**2953**	**2753**	**3768**	**1809**	**2499**	**3370**	**3119**	**4476**	**2241**	1
1972 FED FIRM SURPLUS/DEFICIT	**8520**	**5590**	**2678**	**3705**	**1320**	**3640**	**3374**	**3134**	**4565**	**2599**	1
1973 FED FIRM SURPLUS/DEFICIT	**8502**	**7872**	**2676**	**4290**	**2081**	**3490**	**3060**	**2165**	**903**	**-1483**	-
1974 FED FIRM SURPLUS/DEFICIT	**2870**	**2952**	**2661**	**3013**	**-24**	**4286**	**3390**	**3485**	**4598**	**2387**	
1975 FED FIRM SURPLUS/DEFICIT	**8526**	**7025**	**2906**	**4228**	**2032**	**1786**	**3378**	**3311**	**4747**	**1420**	1
1976 FED FIRM SURPLUS/DEFICIT	**4580**	**5631**	**2673**	**4750**	**3727**	**4424**	**3401**	**3179**	**4515**	**2491**	1
1977 FED FIRM SURPLUS/DEFICIT	**8490**	**9060**	**7134**	**4700**	**2327**	**2786**	**161**	**-1567**	**186**	**152**	1
1978 FED FIRM SURPLUS/DEFICIT	**3000**	**3146**	**2574**	**2924**	**837**	**2055**	**3318**	**3061**	**4557**	**2404**	1

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OPERATING YEAR
RUN DATE: 03/05/93 MEDIUM LOAD FORECAST

PEAK IN MEGAWATTS	AUG	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	A
UNADJUSTED	1-15	16-31								1-15	16
1929 FED FIRM SURPLUS/DEFICIT	6206	3323	3338	3007	1833	2828	-30	-479	673	793	1
1930 FED FIRM SURPLUS/DEFICIT	3084	3179	2443	1676	1392	1856	-312	-1658	329	1544	1
1931 FED FIRM SURPLUS/DEFICIT	5229	3994	2410	1818	1295	2358	-374	-1953	-347	3315	1
1932 FED FIRM SURPLUS/DEFICIT	2268	2950	2342	1322	152	1340	2664	3472	4238	4075	2
1933 FED FIRM SURPLUS/DEFICIT	4744	5519	3964	3044	1604	3139	3931	3635	4456	4014	2
1934 FED FIRM SURPLUS/DEFICIT	7881	7031	3808	3417	4688	4743	3949	3692	4564	4344	2
1935 FED FIRM SURPLUS/DEFICIT	3669	3605	3999	2739	1480	2841	3885	4277	3122	3209	2
1936 FED FIRM SURPLUS/DEFICIT	6668	3386	3982	3171	2373	3181	3530	2014	4223	4362	2
1937 FED FIRM SURPLUS/DEFICIT	3376	3249	3491	3285	2498	2825	-540	253	600	1866	2
1938 FED FIRM SURPLUS/DEFICIT	2350	2616	2395	1379	-1005	1554	3924	3611	4577	4185	2
1939 FED FIRM SURPLUS/DEFICIT	2873	2831	3933	3346	2185	2681	2201	-1379	4800	5186	3
1940 FED FIRM SURPLUS/DEFICIT	4366	3409	3818	3470	2568	2910	2682	-865	4988	6000	4
1941 FED FIRM SURPLUS/DEFICIT	3998	3406	2506	1938	1540	2359	461	653	680	3997	2
1942 FED FIRM SURPLUS/DEFICIT	4919	4893	2385	1658	1775	4680	3897	4276	2783	4956	2
1943 FED FIRM SURPLUS/DEFICIT	5828	3955	4004	3322	1895	2931	3929	3705	4564	4353	2
1944 FED FIRM SURPLUS/DEFICIT	6173	3102	3580	3080	2285	2821	-366	-957	-563	2080	2
1945 FED FIRM SURPLUS/DEFICIT	2633	2530	2449	1431	390	1554	786	-602	901	3025	1
1946 FED FIRM SURPLUS/DEFICIT	2365	2467	2453	1443	537	1245	3962	3698	4601	4072	2
1947 FED FIRM SURPLUS/DEFICIT	6005	3756	3942	3209	1738	4649	3958	3738	4658	4289	2
1948 FED FIRM SURPLUS/DEFICIT	4665	2793	3722	5475	3502	4452	3956	3694	4494	4229	2
1949 FED FIRM SURPLUS/DEFICIT	7573	7086	3989	3102	2121	3118	3934	3891	4839	4626	2
1950 FED FIRM SURPLUS/DEFICIT	2370	2470	2438	1439	194	2972	3953	3672	4522	4257	2
1951 FED FIRM SURPLUS/DEFICIT	7760	6357	3705	4180	4136	4795	3969	3715	4566	4315	2
1952 FED FIRM SURPLUS/DEFICIT	7833	4378	3311	5024	1794	4335	3930	3827	4741	4542	2
1953 FED FIRM SURPLUS/DEFICIT	5283	2467	3627	3121	2452	3084	3985	3764	3790	3754	2
1954 FED FIRM SURPLUS/DEFICIT	5690	4888	3631	3178	1679	2957	3960	3698	4488	4212	2
1955 FED FIRM SURPLUS/DEFICIT	7970	8480	5987	3091	2322	3950	3941	4101	3973	4811	1
1956 FED FIRM SURPLUS/DEFICIT	6802	3089	3442	2022	3001	4788	3967	3682	4495	4212	2
1957 FED FIRM SURPLUS/DEFICIT	6446	5208	2442	1771	1016	4372	3939	3846	4801	4579	2
1958 FED FIRM SURPLUS/DEFICIT	2601	2467	3534	3147	2071	2758	3959	3879	4842	4355	2

1959 FED FIRM SURPLUS/DEFICIT	2891	3109	3557	2990	1645	4029	3979	3681	4477	4242	2459
1960 FED FIRM SURPLUS/DEFICIT	6549	4989	7169	7315	4970	4612	3940	3777	4725	4561	2445
1961 FED FIRM SURPLUS/DEFICIT	5804	2517	3726	3457	1431	2891	3941	3708	4550	4322	2523
1962 FED FIRM SURPLUS/DEFICIT	2967	3993	3701	3112	1985	2507	3926	4069	5082	5006	2870
1963 FED FIRM SURPLUS/DEFICIT	5455	4223	3563	3378	1439	4560	3947	4266	4518	4942	1629
1964 FED FIRM SURPLUS/DEFICIT	5105	4050	4036	3058	1699	2775	3964	3731	4604	4363	1726
1965 FED FIRM SURPLUS/DEFICIT	6866	4744	3576	3486	2328	4784	3968	3766	4615	4340	2538
1966 FED FIRM SURPLUS/DEFICIT	7652	6967	3857	3266	2310	3546	3941	4321	4879	4934	2531
1967 FED FIRM SURPLUS/DEFICIT	5939	3177	3658	3016	2053	2534	3963	3685	4533	4268	1159
1968 FED FIRM SURPLUS/DEFICIT	7417	4866	3819	2621	1692	3217	3971	3979	5133	4023	1315
1969 FED FIRM SURPLUS/DEFICIT	3065	5365	5433	4814	3766	4523	3955	3645	4521	4333	2580
1970 FED FIRM SURPLUS/DEFICIT	3226	2454	2449	2493	1543	2564	3930	4532	5601	5166	1821
1971 FED FIRM SURPLUS/DEFICIT	2374	2466	2548	2193	1564	2840	3949	3593	4466	4041	2318
1972 FED FIRM SURPLUS/DEFICIT	8019	5104	2472	2130	1075	3981	3953	3607	4555	4398	2266
1973 FED FIRM SURPLUS/DEFICIT	8001	7386	2470	2715	1836	3831	3639	2639	893	316	503
1974 FED FIRM SURPLUS/DEFICIT	2369	2465	2456	1438	-269	4627	3969	3959	4588	4186	2170
1975 FED FIRM SURPLUS/DEFICIT	8025	6538	2701	2653	1787	2128	3957	3785	4737	3219	2428
1976 FED FIRM SURPLUS/DEFICIT	4079	5145	2467	3175	3481	4765	3980	3653	4505	4290	2481
1977 FED FIRM SURPLUS/DEFICIT	7989	8574	6928	3125	2082	3127	741	-1093	176	1951	2366
1978 FED FIRM SURPLUS/DEFICIT	2499	2659	2369	1349	592	2396	3897	3534	4547	4203	2422
***Less PP&L contract**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**
***Less cold weather adjustment**					**-1400**	**-1500**	**-1500**	**-1500**			
***Less SOR 5b reduction**	**-1100**	**-1100**	**-1400**	**-50**	**0**	**-500**	**-750**	**-600**	**-1600**	**-3400**	**-2800**
***Add replacement of firm energy deficit**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**
***Add firm capacity to meet Fed firm energy loads at C-E ratio of .87**	**1395**	**1395**	**1395**	**1395**	**1395**	**1395**	**1395**	**1395**	**1395**	**1395**	**1395**

2007- 8
OPERATING YEAR RUN
DATE: 03/05/93 MEDIUM LOAD FORECAST

PEAK IN MEGAWATTS	**AUG**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**	**JAN**	**FEB**	**MAR**	**APR**	**APR**
ADJUSTED	**1-15**	**16-31**								**1-15**	**16-30**
1929 FED FIRM SURPLUS/DEFICIT	**6701**	**3818**	**3533**	**4552**	**2028**	**2423**	**-685**	**-984**	**668**	**-1012**	**690**
1930 FED FIRM SURPLUS/DEFICIT	**3579**	**3674**	**2638**	**3221**	**1587**	**1451**	**-967**	**-2163**	**324**	**-261**	**593**
1931 FED FIRM SURPLUS/DEFICIT	**5724**	**4489**	**2605**	**3363**	**1490**	**1953**	**-1029**	**-2458**	**-352**	**1510**	**-182**
1932 FED FIRM SURPLUS/DEFICIT	**2763**	**3445**	**2537**	**2867**	**347**	**935**	**2009**	**2967**	**4233**	**2270**	**1073**
1933 FED FIRM SURPLUS/DEFICIT	**5239**	**6014**	**4159**	**4589**	**1799**	**2734**	**3276**	**3130**	**4451**	**2209**	**1209**
1934 FED FIRM SURPLUS/DEFICIT	**8376**	**7526**	**4003**	**4962**	**4883**	**4338**	**3294**	**3187**	**4559**	**2539**	**1407**
1935 FED FIRM SURPLUS/DEFICIT	**4164**	**4100**	**4194**	**4284**	**1675**	**2436**	**3230**	**3772**	**3117**	**1404**	**1467**
1936 FED FIRM SURPLUS/DEFICIT	**7163**	**3881**	**4177**	**4716**	**2568**	**2776**	**2875**	**1509**	**4218**	**2557**	**1564**
1937 FED FIRM SURPLUS/DEFICIT	**3871**	**3744**	**3686**	**4830**	**2693**	**2420**	**-1195**	**-252**	**595**	**61**	**860**
1938 FED FIRM SURPLUS/DEFICIT	**2845**	**3111**	**2590**	**2924**	**-810**	**1149**	**3269**	**3106**	**4572**	**2380**	**1132**
1939 FED FIRM SURPLUS/DEFICIT	**3368**	**3326**	**4128**	**4891**	**2380**	**2276**	**1546**	**-1884**	**4795**	**3381**	**2080**
1940 FED FIRM SURPLUS/DEFICIT	**4861**	**3904**	**4013**	**5015**	**2763**	**2505**	**2027**	**-1370**	**4983**	**4195**	**2857**
1941 FED FIRM SURPLUS/DEFICIT	**4493**	**3901**	**2701**	**3483**	**1735**	**1954**	**-194**	**148**	**675**	**2192**	**1501**
1942 FED FIRM SURPLUS/DEFICIT	**5414**	**5388**	**2580**	**3203**	**1970**	**4275**	**3242**	**3771**	**2778**	**3151**	**1441**
1943 FED FIRM SURPLUS/DEFICIT	**6323**	**4450**	**4199**	**4867**	**2090**	**2526**	**3274**	**3200**	**4559**	**2548**	**1348**
1944 FED FIRM SURPLUS/DEFICIT	**6668**	**3597**	**3775**	**4625**	**2480**	**2416**	**-1021**	**-1462**	**-568**	**275**	**966**
1945 FED FIRM SURPLUS/DEFICIT	**3128**	**3025**	**2644**	**2976**	**585**	**1149**	**131**	**-1107**	**896**	**1220**	**99**

1946 FED FIRM SURPLUS/DEFICIT	**2860**	**2962**	**2648**	**2988**	**732**	**840**	**3307**	**3193**	**4596**	**2267**	1
1947 FED FIRM SURPLUS/DEFICIT	**6500**	**4251**	**4137**	**4754**	**1933**	**4244**	**3303**	**3233**	**4653**	**2484**	1
1948 FED FIRM SURPLUS/DEFICIT	**5160**	**3288**	**3917**	**7020**	**3697**	**4047**	**3301**	**3189**	**4489**	**2424**	1
1949 FED FIRM SURPLUS/DEFICIT	**8068**	**7581**	**4184**	**4647**	**2316**	**2713**	**3279**	**3386**	**4834**	**2821**	1
1950 FED FIRM SURPLUS/DEFICIT	**2865**	**2965**	**2633**	**2984**	**389**	**2567**	**3298**	**3167**	**4517**	**2452**	1
1951 FED FIRM SURPLUS/DEFICIT	**8255**	**6852**	**3900**	**5725**	**4331**	**4390**	**3314**	**3210**	**4561**	**2510**	1
1952 FED FIRM SURPLUS/DEFICIT	**8328**	**4873**	**3506**	**6569**	**1989**	**3930**	**3275**	**3322**	**4736**	**2737**	1
1953 FED FIRM SURPLUS/DEFICIT	**5778**	**2962**	**3822**	**4666**	**2647**	**2679**	**3330**	**3259**	**3785**	**1949**	1
1954 FED FIRM SURPLUS/DEFICIT	**6185**	**5383**	**3826**	**4723**	**1874**	**2552**	**3305**	**3193**	**4483**	**2407**	1
1955 FED FIRM SURPLUS/DEFICIT	**8465**	**8975**	**6182**	**4636**	**2517**	**3545**	**3286**	**3596**	**3968**	**3006**	
1956 FED FIRM SURPLUS/DEFICIT	**7297**	**3584**	**3637**	**3567**	**3196**	**4383**	**3312**	**3177**	**4490**	**2407**	1
1957 FED FIRM SURPLUS/DEFICIT	**6941**	**5703**	**2637**	**3316**	**1211**	**3967**	**3284**	**3341**	**4796**	**2774**	1
1958 FED FIRM SURPLUS/DEFICIT	**3096**	**2962**	**3729**	**4692**	**2266**	**2353**	**3304**	**3374**	**4837**	**2550**	1
1959 FED FIRM SURPLUS/DEFICIT	**3386**	**3604**	**3752**	**4535**	**1840**	**3624**	**3324**	**3176**	**4472**	**2437**	1
1960 FED FIRM SURPLUS/DEFICIT	**7044**	**5484**	**7364**	**8860**	**5165**	**4207**	**3285**	**3272**	**4720**	**2756**	1
1961 FED FIRM SURPLUS/DEFICIT	**6299**	**3012**	**3921**	**5002**	**1626**	**2486**	**3286**	**3203**	**4545**	**2517**	1
1962 FED FIRM SURPLUS/DEFICIT	**3462**	**4488**	**3896**	**4657**	**2180**	**2102**	**3271**	**3564**	**5077**	**3201**	1
1963 FED FIRM SURPLUS/DEFICIT	**5950**	**4718**	**3758**	**4923**	**1634**	**4155**	**3292**	**3761**	**4513**	**3137**	
1964 FED FIRM SURPLUS/DEFICIT	**5600**	**4545**	**4231**	**4603**	**1894**	**2370**	**3309**	**3226**	**4599**	**2558**	
1965 FED FIRM SURPLUS/DEFICIT	**7361**	**5239**	**3771**	**5031**	**2523**	**4379**	**3313**	**3261**	**4610**	**2535**	1
1966 FED FIRM SURPLUS/DEFICIT	**8147**	**7462**	**4052**	**4811**	**2505**	**3141**	**3286**	**3816**	**4874**	**3129**	1
1967 FED FIRM SURPLUS/DEFICIT	**6434**	**3672**	**3853**	**4561**	**2248**	**2129**	**3308**	**3180**	**4528**	**2463**	
1968 FED FIRM SURPLUS/DEFICIT	**7912**	**5361**	**4014**	**4166**	**1887**	**2812**	**3316**	**3474**	**5128**	**2218**	
1969 FED FIRM SURPLUS/DEFICIT	**3560**	**5860**	**5628**	**6359**	**3961**	**4118**	**3300**	**3140**	**4516**	**2528**	1
1970 FED FIRM SURPLUS/DEFICIT	**3721**	**2949**	**2644**	**4038**	**1738**	**2159**	**3275**	**4027**	**5596**	**3361**	
1971 FED FIRM SURPLUS/DEFICIT	**2869**	**2961**	**2743**	**3738**	**1759**	**2435**	**3294**	**3088**	**4461**	**2236**	1
1972 FED FIRM SURPLUS/DEFICIT	**8514**	**5599**	**2667**	**3675**	**1270**	**3576**	**3298**	**3102**	**4550**	**2593**	1
1973 FED FIRM SURPLUS/DEFICIT	**8496**	**7881**	**2665**	**4260**	**2031**	**3426**	**2984**	**2134**	**888**	**-1489**	
1974 FED FIRM SURPLUS/DEFICIT	**2864**	**2960**	**2651**	**2983**	**-74**	**4222**	**3314**	**3454**	**4583**	**2381**	
1975 FED FIRM SURPLUS/DEFICIT	**8520**	**7033**	**2896**	**4198**	**1982**	**1723**	**3302**	**3280**	**4732**	**1414**	1
1976 FED FIRM SURPLUS/DEFICIT	**4574**	**5640**	**2662**	**4720**	**3676**	**4360**	**3325**	**3148**	**4500**	**2485**	1
1977 FED FIRM SURPLUS/DEFICIT	**8484**	**9069**	**7123**	**4670**	**2277**	**2722**	**86**	**-1598**	**171**	**146**	1
1978 FED FIRM SURPLUS/DEFICIT	**2994**	**3154**	**2564**	**2894**	**787**	**1991**	**3242**	**3029**	**4542**	**2398**	1

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OPERATING YEAR
RUN DATE: 03/05/93 MEDIUM LOAD
FORECAST

PEAK IN MEGAWATTS	AUG	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	A
UNADJUSTED	1-15	16-31								1-15	16
1929 FED FIRM SURPLUS/DEFICIT	5867	3000	2992	2636	1995	2986	133	-348	532	655	1
1930 FED FIRM SURPLUS/DEFICIT	2745	2855	2096	1304	1553	2014	-149	-1527	188	1406	1
1931 FED FIRM SURPLUS/DEFICIT	4889	3670	2063	1447	1457	2517	-211	-1822	-489	3177	
1932 FED FIRM SURPLUS/DEFICIT	1929	2627	1995	951	314	1498	2827	3603	4096	3938	2
1933 FED FIRM SURPLUS/DEFICIT	4405	5195	3618	2673	1766	3297	4094	3765	4314	3877	2
1934 FED FIRM SURPLUS/DEFICIT	7542	6707	3462	3046	4849	4902	4112	3823	4423	4206	2
1935 FED FIRM SURPLUS/DEFICIT	3329	3281	3653	2367	1642	2999	4048	4407	2981	3071	2
1936 FED FIRM SURPLUS/DEFICIT	6329	3062	3636	2800	2535	3339	3693	2145	4081	4224	2
1937 FED FIRM SURPLUS/DEFICIT	3036	2925	3145	2914	2660	2983	-377	384	459	1728	1
1938 FED FIRM SURPLUS/DEFICIT	2011	2293	2048	1008	-843	1712	4087	3742	4435	4048	2

1939 FED FIRM SURPLUS/DEFICIT	2534	2507	3587	2975	2346	2840	2364	-1249	4659	5048	3148
1940 FED FIRM SURPLUS/DEFICIT	4027	3086	3472	3099	2730	3069	2845	-734	4847	5862	3924
1941 FED FIRM SURPLUS/DEFICIT	3659	3082	2160	1567	1702	2517	624	784	539	3860	2568
1942 FED FIRM SURPLUS/DEFICIT	4580	4570	2038	1286	1937	4839	4060	4407	2642	4818	2508
1943 FED FIRM SURPLUS/DEFICIT	5489	3632	3658	2950	2057	3090	4092	3835	4423	4216	2415
1944 FED FIRM SURPLUS/DEFICIT	5834	2779	3234	2708	2447	2980	-203	-826	-704	1942	2033
1945 FED FIRM SURPLUS/DEFICIT	2294	2206	2102	1060	552	1713	950	-471	759	2888	1166
1946 FED FIRM SURPLUS/DEFICIT	2026	2144	2106	1072	699	1404	4126	3829	4460	3934	2353
1947 FED FIRM SURPLUS/DEFICIT	5666	3433	3596	2837	1900	4808	4121	3869	4516	4151	2482
1948 FED FIRM SURPLUS/DEFICIT	4326	2470	3376	5104	3664	4611	4119	3825	4353	4092	2097
1949 FED FIRM SURPLUS/DEFICIT	7234	6762	3643	2730	2283	3277	4097	4022	4698	4488	2643
1950 FED FIRM SURPLUS/DEFICIT	2031	2147	2091	1068	356	3131	4116	3802	4380	4119	2283
1951 FED FIRM SURPLUS/DEFICIT	7421	6034	3359	3809	4298	4954	4132	3846	4424	4178	2378
1952 FED FIRM SURPLUS/DEFICIT	7494	4055	2965	4653	1956	4494	4093	3958	4599	4404	2602
1953 FED FIRM SURPLUS/DEFICIT	4944	2144	3281	2750	2614	3243	4148	3895	3648	3616	2178
1954 FED FIRM SURPLUS/DEFICIT	5351	4565	3285	2807	1841	3116	4123	3828	4346	4074	2249
1955 FED FIRM SURPLUS/DEFICIT	7631	8157	5641	2720	2484	4108	4104	4231	3831	4673	1261
1956 FED FIRM SURPLUS/DEFICIT	6463	2765	3096	1651	3162	4947	4130	3813	4354	4074	2122
1957 FED FIRM SURPLUS/DEFICIT	6107	4885	2096	1399	1178	4531	4102	3977	4660	4442	2625
1958 FED FIRM SURPLUS/DEFICIT	2261	2144	3188	2775	2233	2917	4122	4010	4700	4217	2376
1959 FED FIRM SURPLUS/DEFICIT	2552	2785	3211	2618	1807	4188	4142	3811	4335	4105	2321
1960 FED FIRM SURPLUS/DEFICIT	6210	4665	6823	6944	5132	4771	4103	3908	4583	4424	2308
1961 FED FIRM SURPLUS/DEFICIT	5465	2194	3380	3085	1593	3050	4104	3839	4409	4184	2385
1962 FED FIRM SURPLUS/DEFICIT	2628	3669	3355	2740	2147	2665	4089	4200	4941	4868	2733
1963 FED FIRM SURPLUS/DEFICIT	5116	3900	3216	3007	1600	4719	4110	4396	4376	4804	1491
1964 FED FIRM SURPLUS/DEFICIT	4765	3726	3690	2686	1861	2933	4128	3862	4462	4225	1588
1965 FED FIRM SURPLUS/DEFICIT	6527	4421	3230	3115	2490	4942	4131	3897	4474	4202	2400
1966 FED FIRM SURPLUS/DEFICIT	7313	6644	3510	2894	2472	3705	4105	4452	4737	4796	2394
1967 FED FIRM SURPLUS/DEFICIT	5599	2854	3312	2645	2215	2692	4126	3815	4392	4131	1021
1968 FED FIRM SURPLUS/DEFICIT	7077	4543	3473	2250	1854	3376	4134	4109	4991	3885	1177
1969 FED FIRM SURPLUS/DEFICIT	2725	5042	5087	4442	3928	4682	4118	3775	4379	4197	2442
1970 FED FIRM SURPLUS/DEFICIT	2887	2131	2103	2121	1704	2723	4093	4662	5459	5028	1683
1971 FED FIRM SURPLUS/DEFICIT	2035	2143	2202	1822	1726	2999	4113	3724	4325	3903	2180
1972 FED FIRM SURPLUS/DEFICIT	7680	4780	2126	1759	1236	4140	4116	3738	4413	4260	2128
1973 FED FIRM SURPLUS/DEFICIT	7662	7062	2124	2344	1998	3990	3802	2770	752	179	366
1974 FED FIRM SURPLUS/DEFICIT	2030	2142	2109	1067	-107	4786	4133	4089	4446	4048	2032
1975 FED FIRM SURPLUS/DEFICIT	7686	6215	2355	2282	1949	2286	4120	3916	4595	3082	2290
1976 FED FIRM SURPLUS/DEFICIT	3739	4821	2121	2804	3643	4924	4143	3783	4363	4152	2344
1977 FED FIRM SURPLUS/DEFICIT	7650	8250	6582	2753	2244	3286	904	-963	35	1813	2228
1978 FED FIRM SURPLUS/DEFICIT	2159	2336	2022	978	754	2555	4060	3665	4406	4065	2284
***Less PP&L contract**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**
***Less cold weather adjustment**					**-1400**	**-1500**	**-1500**	**-1500**			
***Less SOR 5b reduction**	**-1100**	**-1100**	**-1400**	**-50**	**0**	**-500**	**-750**	**-600**	**-1600**	**-3400**	**-2800**
***Add replacement of firm energy deficit**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**
***Add firm capacity to meet Fed firm energy loads at C-E ratio of .88**	**1446**	**1446**	**1446**	**1446**	**1446**	**1446**	**1446**	**1446**	**1446**	**1446**	**1446**

2008- 9
OPERATING YEAR RUN
DATE: 03/05/93 MEDIUM LOAD FORECAST

PEAK IN MEGAWATTS	AUG	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	
ADJUSTED	1-15	16-31								1-15	1
1929 FED FIRM SURPLUS/DEFICIT	6413	3546	3238	4232	2241	2632	-471	-802	578	-1099	
1930 FED FIRM SURPLUS/DEFICIT	3291	3401	2342	2900	1799	1660	-753	-1981	234	-348	
1931 FED FIRM SURPLUS/DEFICIT	5435	4216	2309	3043	1703	2163	-815	-2276	-443	1423	
1932 FED FIRM SURPLUS/DEFICIT	2475	3173	2241	2547	560	1144	2223	3149	4142	2184	
1933 FED FIRM SURPLUS/DEFICIT	4951	5741	3864	4269	2012	2943	3490	3311	4360	2123	1
1934 FED FIRM SURPLUS/DEFICIT	8088	7253	3708	4642	5095	4548	3508	3369	4469	2452	1
1935 FED FIRM SURPLUS/DEFICIT	3875	3827	3899	3963	1888	2645	3444	3953	3027	1317	1
1936 FED FIRM SURPLUS/DEFICIT	6875	3608	3882	4396	2781	2985	3089	1691	4127	2470	1
1937 FED FIRM SURPLUS/DEFICIT	3582	3471	3391	4510	2906	2629	-981	-70	505	-26	
1938 FED FIRM SURPLUS/DEFICIT	2557	2839	2294	2604	-597	1358	3483	3288	4481	2294	1
1939 FED FIRM SURPLUS/DEFICIT	3080	3053	3833	4571	2592	2486	1760	-1703	4705	3294	1
1940 FED FIRM SURPLUS/DEFICIT	4573	3632	3718	4695	2976	2715	2241	-1188	4893	4108	2
1941 FED FIRM SURPLUS/DEFICIT	4205	3628	2406	3163	1948	2163	20	330	585	2106	1
1942 FED FIRM SURPLUS/DEFICIT	5126	5116	2284	2882	2183	4485	3456	3953	2688	3064	1
1943 FED FIRM SURPLUS/DEFICIT	6035	4178	3904	4546	2303	2736	3488	3381	4469	2462	1
1944 FED FIRM SURPLUS/DEFICIT	6380	3325	3480	4304	2693	2626	-807	-1280	-658	188	
1945 FED FIRM SURPLUS/DEFICIT	2840	2752	2348	2656	798	1359	346	-925	805	1134	
1946 FED FIRM SURPLUS/DEFICIT	2572	2690	2352	2668	945	1050	3522	3375	4506	2180	1
1947 FED FIRM SURPLUS/DEFICIT	6212	3979	3842	4433	2146	4454	3517	3415	4562	2397	1
1948 FED FIRM SURPLUS/DEFICIT	4872	3016	3622	6700	3910	4257	3515	3371	4399	2338	
1949 FED FIRM SURPLUS/DEFICIT	7780	7308	3889	4326	2529	2923	3493	3568	4744	2734	1
1950 FED FIRM SURPLUS/DEFICIT	2577	2693	2337	2664	602	2777	3512	3348	4426	2365	1
1951 FED FIRM SURPLUS/DEFICIT	7967	6580	3605	5405	4544	4600	3528	3392	4470	2424	1
1952 FED FIRM SURPLUS/DEFICIT	8040	4601	3211	6249	2202	4140	3489	3504	4645	2650	1
1953 FED FIRM SURPLUS/DEFICIT	5490	2690	3527	4346	2860	2889	3544	3441	3694	1862	1
1954 FED FIRM SURPLUS/DEFICIT	5897	5111	3531	4403	2087	2762	3519	3374	4392	2320	1
1955 FED FIRM SURPLUS/DEFICIT	8177	8703	5887	4316	2730	3754	3500	3777	3877	2919	
1956 FED FIRM SURPLUS/DEFICIT	7009	3311	3342	3247	3408	4593	3526	3359	4400	2320	
1957 FED FIRM SURPLUS/DEFICIT	6653	5431	2342	2995	1424	4177	3498	3523	4706	2688	1
1958 FED FIRM SURPLUS/DEFICIT	2807	2690	3434	4371	2479	2563	3518	3556	4746	2463	1
1959 FED FIRM SURPLUS/DEFICIT	3098	3331	3457	4214	2053	3834	3538	3357	4381	2351	1
1960 FED FIRM SURPLUS/DEFICIT	6756	5211	7069	8540	5378	4417	3499	3454	4629	2670	1
1961 FED FIRM SURPLUS/DEFICIT	6011	2740	3626	4681	1839	2696	3500	3385	4455	2430	1
1962 FED FIRM SURPLUS/DEFICIT	3174	4215	3601	4336	2393	2311	3485	3746	4987	3114	1
1963 FED FIRM SURPLUS/DEFICIT	5662	4446	3462	4603	1846	4365	3506	3942	4422	3050	
1964 FED FIRM SURPLUS/DEFICIT	5311	4272	3936	4282	2107	2579	3524	3408	4508	2471	
1965 FED FIRM SURPLUS/DEFICIT	7073	4967	3476	4711	2736	4588	3527	3443	4520	2448	1
1966 FED FIRM SURPLUS/DEFICIT	7859	7190	3756	4490	2718	3351	3501	3998	4783	3042	1
1967 FED FIRM SURPLUS/DEFICIT	6145	3400	3558	4241	2461	2338	3522	3361	4438	2377	
1968 FED FIRM SURPLUS/DEFICIT	7623	5089	3719	3846	2100	3022	3530	3655	5037	2131	
1969 FED FIRM SURPLUS/DEFICIT	3271	5588	5333	6038	4174	4328	3514	3321	4425	2443	1
1970 FED FIRM SURPLUS/DEFICIT	3433	2677	2349	3717	1950	2369	3489	4208	5505	3274	
1971 FED FIRM SURPLUS/DEFICIT	2581	2689	2448	3418	1972	2645	3509	3270	4371	2149	1
1972 FED FIRM SURPLUS/DEFICIT	8226	5326	2372	3355	1482	3786	3512	3284	4459	2506	

1973 FED FIRM SURPLUS/DEFICIT	**8208**	**7608**	**2370**	**3940**	**2244**	**3636**	**3198**	**2316**	**798**	**-1575**	**-788**
1974 FED FIRM SURPLUS/DEFICIT	**2576**	**2688**	**2355**	**2663**	**139**	**4432**	**3529**	**3635**	**4492**	**2294**	**878**
1975 FED FIRM SURPLUS/DEFICIT	**8232**	**6761**	**2601**	**3878**	**2195**	**1932**	**3516**	**3462**	**4641**	**1328**	**1136**
1976 FED FIRM SURPLUS/DEFICIT	**4285**	**5367**	**2367**	**4400**	**3889**	**4570**	**3539**	**3329**	**4409**	**2398**	**1190**
1977 FED FIRM SURPLUS/DEFICIT	**8196**	**8796**	**6828**	**4349**	**2490**	**2932**	**300**	**-1417**	**81**	**59**	**1074**
1978 FED FIRM SURPLUS/DEFICIT	**2705**	**2882**	**2268**	**2574**	**1000**	**2201**	**3456**	**3211**	**4452**	**2311**	**1130**

2009-10

OPERATING YEAR
RUN DATE: 03/05/93 MEDIUM LOAD FORECAST

PEAK IN MEGAWATTS	AUG	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	APR
UNADJUSTED	1-15	16-31								1-15	16-30
1929 FED FIRM SURPLUS/DEFICIT	6019	3166	3142	2770	2142	3114	250	-219	672	811	1913
1930 FED FIRM SURPLUS/DEFICIT	2897	3022	2247	1439	1700	2142	-32	-1398	328	1561	1815
1931 FED FIRM SURPLUS/DEFICIT	5041	3837	2214	1581	1603	2644	-94	-1693	-349	3332	1041
1932 FED FIRM SURPLUS/DEFICIT	2081	2793	2146	1085	460	1625	2944	3732	4236	4093	2296
1933 FED FIRM SURPLUS/DEFICIT	4557	5362	3768	2807	1913	3425	4211	3895	4455	4032	2431
1934 FED FIRM SURPLUS/DEFICIT	7694	6874	3612	3180	4996	5029	4230	3952	4563	4362	2630
1935 FED FIRM SURPLUS/DEFICIT	3481	3448	3803	2502	1788	3127	4165	4537	3121	3227	2690
1936 FED FIRM SURPLUS/DEFICIT	6481	3229	3786	2934	2681	3467	3810	2274	4221	4380	2787
1937 FED FIRM SURPLUS/DEFICIT	3188	3092	3295	3048	2806	3110	-260	513	599	1884	2083
1938 FED FIRM SURPLUS/DEFICIT	2163	2459	2199	1142	-697	1839	4204	3871	4575	4203	2354
1939 FED FIRM SURPLUS/DEFICIT	2686	2674	3737	3109	2493	2967	2481	-1119	4799	5204	3303
1940 FED FIRM SURPLUS/DEFICIT	4179	3252	3622	3233	2876	3196	2962	-605	4987	6017	4080
1941 FED FIRM SURPLUS/DEFICIT	3811	3249	2310	1701	1848	2644	741	913	679	4015	2723
1942 FED FIRM SURPLUS/DEFICIT	4732	4736	2189	1420	2083	4966	4177	4536	2782	4974	2665
1943 FED FIRM SURPLUS/DEFICIT	5641	3799	3809	3084	2203	3217	4209	3965	4563	4371	2571
1944 FED FIRM SURPLUS/DEFICIT	5986	2946	3384	2843	2593	3107	-86	-697	-564	2098	2189
1945 FED FIRM SURPLUS/DEFICIT	2446	2373	2253	1194	698	1840	1067	-342	899	3043	1321
1946 FED FIRM SURPLUS/DEFICIT	2178	2310	2257	1206	845	1531	4243	3958	4600	4089	2509
1947 FED FIRM SURPLUS/DEFICIT	5818	3600	3746	2972	2047	4935	4239	3998	4656	4307	2638
1948 FED FIRM SURPLUS/DEFICIT	4478	2636	3526	5238	3810	4738	4237	3954	4493	4247	2252
1949 FED FIRM SURPLUS/DEFICIT	7386	6929	3793	2864	2429	3404	4214	4151	4838	4644	2799
1950 FED FIRM SURPLUS/DEFICIT	2183	2313	2242	1202	502	3258	4234	3932	4520	4275	2439
1951 FED FIRM SURPLUS/DEFICIT	7573	6201	3509	3943	4444	5081	4250	3975	4564	4333	2533
1952 FED FIRM SURPLUS/DEFICIT	7646	4222	3115	4787	2102	4621	4211	4088	4740	4559	2757
1953 FED FIRM SURPLUS/DEFICIT	5096	2310	3432	2884	2760	3370	4265	4024	3788	3772	2334
1954 FED FIRM SURPLUS/DEFICIT	5503	4732	3435	2941	1987	3243	4241	3958	4487	4230	2404
1955 FED FIRM SURPLUS/DEFICIT	7783	8324	5792	2854	2630	4235	4221	4361	3972	4828	1417
1956 FED FIRM SURPLUS/DEFICIT	6615	2932	3246	1785	3309	5074	4248	3942	4494	4229	2277
1957 FED FIRM SURPLUS/DEFICIT	6259	5052	2246	1534	1324	4658	4220	4106	4800	4596	2781
1958 FED FIRM SURPLUS/DEFICIT	2413	2310	3338	2909	2379	3044	4239	4139	4840	4373	2532
1959 FED FIRM SURPLUS/DEFICIT	2704	2952	3361	2752	1953	4315	4260	3941	4476	4260	2477
1960 FED FIRM SURPLUS/DEFICIT	6362	4832	6973	7078	5278	4898	4221	4037	4724	4579	2463
1961 FED FIRM SURPLUS/DEFICIT	5617	2360	3531	3219	1739	3177	4221	3968	4549	4340	2541
1962 FED FIRM SURPLUS/DEFICIT	2780	3836	3505	2875	2293	2793	4207	4330	5081	5024	2888
1963 FED FIRM SURPLUS/DEFICIT	5268	4066	3367	3141	1747	4846	4227	4526	4516	4960	1647
1964 FED FIRM SURPLUS/DEFICIT	4917	3893	3840	2820	2007	3061	4245	3991	4603	4381	1744
1965 FED FIRM SURPLUS/DEFICIT	6679	4588	3380	3249	2636	5069	4249	4026	4614	4358	2556

1966 FED FIRM SURPLUS/DEFICIT	7465	6810	3661	3028	2618	3832	4222	4581	4877	4952	2
1967 FED FIRM SURPLUS/DEFICIT	5751	3020	3462	2779	2361	2819	4243	3945	4532	4286	1
1968 FED FIRM SURPLUS/DEFICIT	7229	4709	3623	2384	2000	3503	4251	4239	5131	4041	1
1969 FED FIRM SURPLUS/DEFICIT	2877	5209	5237	4576	4074	4809	4236	3905	4519	4351	2
1970 FED FIRM SURPLUS/DEFICIT	3039	2297	2253	2255	1851	2850	4210	4792	5599	5184	1
1971 FED FIRM SURPLUS/DEFICIT	2187	2309	2352	1956	1872	3126	4230	3853	4465	4058	2
1972 FED FIRM SURPLUS/DEFICIT	7832	4947	2276	1893	1383	4267	4234	3867	4553	4416	2
1973 FED FIRM SURPLUS/DEFICIT	7814	7229	2274	2478	2144	4117	3919	2899	892	334	
1974 FED FIRM SURPLUS/DEFICIT	2182	2308	2260	1201	39	4913	4250	4219	4586	4203	2
1975 FED FIRM SURPLUS/DEFICIT	7838	6382	2505	2416	2095	2413	4238	4045	4735	3237	2
1976 FED FIRM SURPLUS/DEFICIT	3891	4988	2271	2938	3790	5051	4261	3913	4503	4307	2
1977 FED FIRM SURPLUS/DEFICIT	7802	8417	6732	2887	2390	3413	1021	-833	175	1968	2
1978 FED FIRM SURPLUS/DEFICIT	2311	2502	2173	1112	900	2682	4178	3795	4546	4220	2
***Less PP&L contract**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1**
***Less cold weather adjustment**					**-1400**	**-1500**	**-1500**	**-1500**			
***Less SOR 5b reduction**	**-1100**	**-1100**	**-1400**	**-50**	**0**	**-500**	**-750**	**-600**	**-1600**	**-3400**	**-2**
***Add replacement of firm energy deficit**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1**
***Add firm capacity to meet Fed firm energy loads at C-E ratio of .89**	**1462**	**1462**	**1462**	**1462**	**1462**	**1462**	**1462**	**1462**	**1462**	**1462**	**1**

2009-10
OPERATING YEAR RUN
DATE: 03/05/93 MEDIUM LOAD FORECAST

PEAK IN MEGAWATTS	**AUG**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**	**JAN**	**FEB**	**MAR**	**APR**	
ADJUSTED	**1-15**	**16-31**								**1-15**	**1**
1929 FED FIRM SURPLUS/DEFICIT	**6581**	**3728**	**3404**	**4382**	**2404**	**2776**	**-338**	**-657**	**734**	**-927**	
1930 FED FIRM SURPLUS/DEFICIT	**3459**	**3584**	**2509**	**3051**	**1962**	**1804**	**-620**	**-1836**	**390**	**-177**	
1931 FED FIRM SURPLUS/DEFICIT	**5603**	**4399**	**2476**	**3193**	**1865**	**2306**	**-682**	**-2131**	**-287**	**1594**	
1932 FED FIRM SURPLUS/DEFICIT	**2643**	**3355**	**2408**	**2697**	**722**	**1287**	**2356**	**3294**	**4298**	**2355**	**1**
1933 FED FIRM SURPLUS/DEFICIT	**5119**	**5924**	**4030**	**4419**	**2175**	**3087**	**3623**	**3457**	**4517**	**2294**	**1**
1934 FED FIRM SURPLUS/DEFICIT	**8256**	**7436**	**3874**	**4792**	**5258**	**4691**	**3642**	**3514**	**4625**	**2624**	**1**
1935 FED FIRM SURPLUS/DEFICIT	**4043**	**4010**	**4065**	**4114**	**2050**	**2789**	**3577**	**4099**	**3183**	**1489**	**1**
1936 FED FIRM SURPLUS/DEFICIT	**7043**	**3791**	**4048**	**4546**	**2943**	**3129**	**3222**	**1836**	**4283**	**2642**	**1**
1937 FED FIRM SURPLUS/DEFICIT	**3750**	**3654**	**3557**	**4660**	**3068**	**2772**	**-848**	**75**	**661**	**146**	
1938 FED FIRM SURPLUS/DEFICIT	**2725**	**3021**	**2461**	**2754**	**-435**	**1501**	**3616**	**3433**	**4637**	**2465**	**1**
1939 FED FIRM SURPLUS/DEFICIT	**3248**	**3236**	**3999**	**4721**	**2755**	**2629**	**1893**	**-1557**	**4861**	**3466**	**2**
1940 FED FIRM SURPLUS/DEFICIT	**4741**	**3814**	**3884**	**4845**	**3138**	**2858**	**2374**	**-1043**	**5049**	**4279**	**2**
1941 FED FIRM SURPLUS/DEFICIT	**4373**	**3811**	**2572**	**3313**	**2110**	**2306**	**153**	**475**	**741**	**2277**	**1**
1942 FED FIRM SURPLUS/DEFICIT	**5294**	**5298**	**2451**	**3032**	**2345**	**4628**	**3589**	**4098**	**2844**	**3236**	**1**
1943 FED FIRM SURPLUS/DEFICIT	**6203**	**4361**	**4071**	**4696**	**2465**	**2879**	**3621**	**3527**	**4625**	**2633**	**1**
1944 FED FIRM SURPLUS/DEFICIT	**6548**	**3508**	**3646**	**4455**	**2855**	**2769**	**-674**	**-1135**	**-502**	**360**	**1**
1945 FED FIRM SURPLUS/DEFICIT	**3008**	**2935**	**2515**	**2806**	**960**	**1502**	**479**	**-780**	**961**	**1305**	
1946 FED FIRM SURPLUS/DEFICIT	**2740**	**2872**	**2519**	**2818**	**1107**	**1193**	**3655**	**3520**	**4662**	**2351**	**1**
1947 FED FIRM SURPLUS/DEFICIT	**6380**	**4162**	**4008**	**4584**	**2309**	**4597**	**3651**	**3560**	**4718**	**2569**	**1**
1948 FED FIRM SURPLUS/DEFICIT	**5040**	**3198**	**3788**	**6850**	**4072**	**4400**	**3649**	**3516**	**4555**	**2509**	**1**
1949 FED FIRM SURPLUS/DEFICIT	**7948**	**7491**	**4055**	**4476**	**2691**	**3066**	**3626**	**3713**	**4900**	**2906**	**1**
1950 FED FIRM SURPLUS/DEFICIT	**2745**	**2875**	**2504**	**2814**	**764**	**2920**	**3646**	**3494**	**4582**	**2537**	**1**
1951 FED FIRM SURPLUS/DEFICIT	**8135**	**6763**	**3771**	**5555**	**4706**	**4743**	**3662**	**3537**	**4626**	**2595**	**1**

1952 FED FIRM SURPLUS/DEFICIT	**8208**	**4784**	**3377**	**6399**	**2364**	**4283**	**3623**	**3650**	**4802**	**2821**	**1619**
1953 FED FIRM SURPLUS/DEFICIT	**5658**	**2872**	**3694**	**4496**	**3022**	**3032**	**3677**	**3586**	**3850**	**2034**	**1196**
1954 FED FIRM SURPLUS/DEFICIT	**6065**	**5294**	**3697**	**4553**	**2249**	**2905**	**3653**	**3520**	**4549**	**2492**	**1266**
1955 FED FIRM SURPLUS/DEFICIT	**8345**	**8886**	**6054**	**4466**	**2892**	**3897**	**3633**	**3923**	**4034**	**3090**	**279**
1956 FED FIRM SURPLUS/DEFICIT	**7177**	**3494**	**3508**	**3397**	**3571**	**4736**	**3660**	**3504**	**4556**	**2491**	**1139**
1957 FED FIRM SURPLUS/DEFICIT	**6821**	**5614**	**2508**	**3146**	**1586**	**4320**	**3632**	**3668**	**4862**	**2858**	**1643**
1958 FED FIRM SURPLUS/DEFICIT	**2975**	**2872**	**3600**	**4521**	**2641**	**2706**	**3651**	**3701**	**4902**	**2635**	**1394**
1959 FED FIRM SURPLUS/DEFICIT	**3266**	**3514**	**3623**	**4364**	**2215**	**3977**	**3672**	**3503**	**4538**	**2522**	**1339**
1960 FED FIRM SURPLUS/DEFICIT	**6924**	**5394**	**7235**	**8690**	**5540**	**4560**	**3633**	**3599**	**4786**	**2841**	**1325**
1961 FED FIRM SURPLUS/DEFICIT	**6179**	**2922**	**3793**	**4831**	**2001**	**2839**	**3633**	**3530**	**4611**	**2602**	**1403**
1962 FED FIRM SURPLUS/DEFICIT	**3342**	**4398**	**3767**	**4487**	**2555**	**2455**	**3619**	**3892**	**5143**	**3286**	**1750**
1963 FED FIRM SURPLUS/DEFICIT	**5830**	**4628**	**3629**	**4753**	**2009**	**4508**	**3639**	**4088**	**4578**	**3222**	**509**
1964 FED FIRM SURPLUS/DEFICIT	**5479**	**4455**	**4102**	**4432**	**2269**	**2723**	**3657**	**3553**	**4665**	**2643**	**606**
1965 FED FIRM SURPLUS/DEFICIT	**7241**	**5150**	**3642**	**4861**	**2898**	**4731**	**3661**	**3588**	**4676**	**2620**	**1418**
1966 FED FIRM SURPLUS/DEFICIT	**8027**	**7372**	**3923**	**4640**	**2880**	**3494**	**3634**	**4143**	**4939**	**3214**	**1411**
1967 FED FIRM SURPLUS/DEFICIT	**6313**	**3582**	**3724**	**4391**	**2623**	**2481**	**3655**	**3507**	**4594**	**2548**	**38**
1968 FED FIRM SURPLUS/DEFICIT	**7791**	**5271**	**3885**	**3996**	**2262**	**3165**	**3663**	**3801**	**5193**	**2303**	**195**
1969 FED FIRM SURPLUS/DEFICIT	**3439**	**5771**	**5499**	**6188**	**4336**	**4471**	**3648**	**3467**	**4581**	**2613**	**1459**
1970 FED FIRM SURPLUS/DEFICIT	**3601**	**2859**	**2515**	**3867**	**2113**	**2512**	**3622**	**4354**	**5661**	**3446**	**701**
1971 FED FIRM SURPLUS/DEFICIT	**2749**	**2871**	**2614**	**3568**	**2134**	**2788**	**3642**	**3415**	**4527**	**2320**	**1197**
1972 FED FIRM SURPLUS/DEFICIT	**8394**	**5509**	**2538**	**3505**	**1645**	**3929**	**3646**	**3429**	**4615**	**2678**	**1146**
1973 FED FIRM SURPLUS/DEFICIT	**8376**	**7791**	**2536**	**4090**	**2406**	**3779**	**3331**	**2461**	**954**	**-1404**	**-617**
1974 FED FIRM SURPLUS/DEFICIT	**2744**	**2870**	**2522**	**2813**	**301**	**4575**	**3662**	**3781**	**4648**	**2465**	**1050**
1975 FED FIRM SURPLUS/DEFICIT	**8400**	**6944**	**2767**	**4028**	**2357**	**2075**	**3650**	**3607**	**4797**	**1499**	**1308**
1976 FED FIRM SURPLUS/DEFICIT	**4453**	**5550**	**2533**	**4550**	**4052**	**4713**	**3673**	**3475**	**4565**	**2569**	**1361**
1977 FED FIRM SURPLUS/DEFICIT	**8364**	**8979**	**6994**	**4499**	**2652**	**3075**	**433**	**-1271**	**237**	**230**	**1246**
1978 FED FIRM SURPLUS/DEFICIT	**2873**	**3064**	**2435**	**2724**	**1162**	**2344**	**3590**	**3357**	**4608**	**2482**	**1302**

2010-11

OPERATING YEAR

RUN DATE: 03/05/93 MEDIUM LOAD FORECAST

PEAK IN MEGAWATTS	AUG	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	APR
UNADJUSTED	1-15	16-31								1-15	16-30
1929 FED FIRM SURPLUS/DEFICIT	5998	3162	3118	2764	2081	3043	163	-305	594	747	1850
1930 FED FIRM SURPLUS/DEFICIT	2876	3017	2222	1433	1639	2071	-119	-1484	250	1498	1752
1931 FED FIRM SURPLUS/DEFICIT	5021	3832	2189	1575	1543	2574	-181	-1779	-426	3269	978
1932 FED FIRM SURPLUS/DEFICIT	2061	2789	2121	1079	399	1555	2857	3646	4159	4029	2232
1933 FED FIRM SURPLUS/DEFICIT	4537	5357	3743	2801	1852	3354	4124	3809	4377	3969	2368
1934 FED FIRM SURPLUS/DEFICIT	7673	6869	3588	3174	4935	4959	4142	3866	4485	4298	2566
1935 FED FIRM SURPLUS/DEFICIT	3461	3443	3778	2496	1727	3056	4078	4451	3043	3163	2627
1936 FED FIRM SURPLUS/DEFICIT	6461	3224	3762	2928	2621	3396	3723	2188	4144	4316	2723
1937 FED FIRM SURPLUS/DEFICIT	3168	3087	3271	3042	2746	3040	-347	427	521	1820	2020
1938 FED FIRM SURPLUS/DEFICIT	2143	2455	2174	1136	-757	1769	4117	3785	4498	4140	2291
1939 FED FIRM SURPLUS/DEFICIT	2666	2669	3713	3103	2432	2897	2394	-1205	4721	5140	3240
1940 FED FIRM SURPLUS/DEFICIT	4158	3248	3597	3227	2816	3126	2875	-691	4909	5954	4016
1941 FED FIRM SURPLUS/DEFICIT	3791	3244	2285	1695	1788	2574	654	827	601	3952	2660
1942 FED FIRM SURPLUS/DEFICIT	4711	4732	2164	1414	2022	4896	4090	4450	2704	4910	2601
1943 FED FIRM SURPLUS/DEFICIT	5620	3794	3784	3078	2142	3147	4122	3879	4485	4307	2507
1944 FED FIRM SURPLUS/DEFICIT	5965	2941	3360	2837	2533	3037	-173	-783	-642	2034	2125

1945 FED FIRM SURPLUS/DEFICIT	2425	2368	2228	1188	637	1770	980	-428	822	2980	1
1946 FED FIRM SURPLUS/DEFICIT	2158	2306	2232	1200	785	1461	4156	3872	4522	4026	2
1947 FED FIRM SURPLUS/DEFICIT	5797	3595	3722	2966	1986	4865	4151	3912	4579	4243	2
1948 FED FIRM SURPLUS/DEFICIT	4458	2632	3501	5232	3750	4668	4149	3868	4415	4184	2
1949 FED FIRM SURPLUS/DEFICIT	7365	6924	3768	2858	2369	3334	4127	4065	4760	4580	2
1950 FED FIRM SURPLUS/DEFICIT	2163	2309	2217	1196	442	3188	4146	3846	4443	4211	2
1951 FED FIRM SURPLUS/DEFICIT	7552	6196	3485	3937	4384	5011	4162	3889	4487	4270	2
1952 FED FIRM SURPLUS/DEFICIT	7625	4217	3090	4781	2042	4551	4123	4002	4662	4496	2
1953 FED FIRM SURPLUS/DEFICIT	5075	2306	3407	2878	2699	3300	4178	3938	3711	3708	2
1954 FED FIRM SURPLUS/DEFICIT	5482	4727	3411	2935	1926	3173	4153	3872	4409	4166	2
1955 FED FIRM SURPLUS/DEFICIT	7762	8319	5767	2848	2570	4165	4134	4275	3894	4765	1
1956 FED FIRM SURPLUS/DEFICIT	6594	2927	3221	1779	3248	5004	4160	3856	4416	4166	2
1957 FED FIRM SURPLUS/DEFICIT	6238	5047	2222	1528	1264	4588	4132	4020	4722	4533	2
1958 FED FIRM SURPLUS/DEFICIT	2393	2306	3313	2903	2319	2973	4152	4053	4763	4309	2
1959 FED FIRM SURPLUS/DEFICIT	2684	2947	3337	2746	1892	4245	4172	3854	4398	4197	2
1960 FED FIRM SURPLUS/DEFICIT	6341	4827	6949	7072	5217	4828	4133	3951	4646	4516	2
1961 FED FIRM SURPLUS/DEFICIT	5596	2355	3506	3214	1678	3107	4134	3882	4471	4276	2
1962 FED FIRM SURPLUS/DEFICIT	2759	3831	3481	2869	2233	2722	4120	4244	5003	4960	2
1963 FED FIRM SURPLUS/DEFICIT	5248	4062	3342	3135	1686	4775	4140	4440	4439	4897	1
1964 FED FIRM SURPLUS/DEFICIT	4897	3888	3816	2815	1946	2990	4158	3905	4525	4317	1
1965 FED FIRM SURPLUS/DEFICIT	6658	4583	3356	3243	2575	4999	4161	3940	4536	4294	2
1966 FED FIRM SURPLUS/DEFICIT	7444	6806	3636	3023	2558	3762	4135	4495	4800	4888	2
1967 FED FIRM SURPLUS/DEFICIT	5731	3015	3438	2773	2300	2749	4156	3858	4454	4223	1
1968 FED FIRM SURPLUS/DEFICIT	7209	4705	3599	2378	1940	3433	4164	4153	5054	3977	1
1969 FED FIRM SURPLUS/DEFICIT	2857	5204	5212	4570	4014	4739	4148	3818	4442	4288	2
1970 FED FIRM SURPLUS/DEFICIT	3018	2293	2229	2249	1790	2780	4123	4705	5522	5120	1
1971 FED FIRM SURPLUS/DEFICIT	2167	2305	2327	1950	1812	3056	4143	3767	4387	3994	2
1972 FED FIRM SURPLUS/DEFICIT	7811	4942	2252	1887	1322	4197	4146	3781	4476	4352	2
1973 FED FIRM SURPLUS/DEFICIT	7793	7224	2250	2472	2083	4047	3832	2813	814	271	
1974 FED FIRM SURPLUS/DEFICIT	2162	2304	2235	1195	-22	4843	4163	4133	4509	4140	2
1975 FED FIRM SURPLUS/DEFICIT	7817	6377	2480	2410	2035	2343	4151	3959	4658	3174	2
1976 FED FIRM SURPLUS/DEFICIT	3871	4983	2247	2932	3729	4981	4173	3827	4426	4244	2
1977 FED FIRM SURPLUS/DEFICIT	7781	8412	6708	2882	2330	3343	934	-920	97	1905	2
1978 FED FIRM SURPLUS/DEFICIT	2291	2498	2148	1106	840	2612	4091	3708	4468	4157	2
***Less PP&L contract**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1**
***Less cold weather adjustment**					**-1400**	**-1500**	**-1500**	**-1500**			
***Less SOR 5b reduction**	**-1100**	**-1100**	**-1400**	**-50**	**0**	**-500**	**-750**	**-600**	**-1600**	**-3400**	**-2**
***Add replacement of firm energy deficit**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1**
***Add firm capacity to meet Fed firm energy loads at C-E ratio of .90**	**1486**	**1486**	**1486**	**1486**	**1486**	**1486**	**1486**	**1486**	**1486**	**1486**	**1**

2010-11
OPERATING YEAR RUN
DATE: 03/05/93 MEDIUM LOAD FORECAST

PEAK IN MEGAWATTS	**AUG**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**	**JAN**	**FEB**	**MAR**	**APR**	
ADJUSTED	**1-15**	**16-31**								**1-15**	**1**
1929 FED FIRM SURPLUS/DEFICIT	**6584**	**3748**	**3404**	**4400**	**2367**	**2729**	**-401**	**-719**	**680**	**-967**	
1930 FED FIRM SURPLUS/DEFICIT	**3462**	**3603**	**2508**	**3069**	**1925**	**1757**	**-683**	**-1898**	**336**	**-216**	

1930 FED FIRM SURPLUS/DEFICIT	5607	4418	2475	3211	1829	2260	-745	-2193	-340	1555	-136
1931 FED FIRM SURPLUS/DEFICIT	2647	3375	2407	2715	685	1241	2293	3232	4245	2315	1118
1932 FED FIRM SURPLUS/DEFICIT	5123	5943	4029	4437	2138	3040	3560	3395	4463	2255	1254
1933 FED FIRM SURPLUS/DEFICIT	8259	7455	3874	4810	5221	4645	3578	3452	4571	2584	1452
1934 FED FIRM SURPLUS/DEFICIT	4047	4029	4064	4132	2013	2742	3514	4037	3129	1449	1513
1935 FED FIRM SURPLUS/DEFICIT	7047	3810	4048	4564	2907	3082	3159	1774	4230	2602	1609
1936 FED FIRM SURPLUS/DEFICIT	3754	3673	3557	4678	3032	2726	-911	13	607	106	906
1937 FED FIRM SURPLUS/DEFICIT	2729	3041	2460	2772	-471	1455	3553	3371	4584	2426	1177
1938 FED FIRM SURPLUS/DEFICIT	3252	3255	3999	4739	2718	2583	1830	-1619	4807	3426	2126
1939 FED FIRM SURPLUS/DEFICIT	4744	3834	3883	4863	3102	2812	2311	-1105	4995	4240	2902
1940 FED FIRM SURPLUS/DEFICIT	4377	3830	2571	3331	2074	2260	90	413	687	2238	1546
1941 FED FIRM SURPLUS/DEFICIT	5297	5318	2450	3050	2308	4582	3526	4036	2790	3196	1487
1942 FED FIRM SURPLUS/DEFICIT	6206	4380	4070	4714	2428	2833	3558	3465	4571	2593	1393
1943 FED FIRM SURPLUS/DEFICIT	6551	3527	3646	4473	2819	2723	-737	-1197	-556	320	1011
1944 FED FIRM SURPLUS/DEFICIT	3011	2954	2514	2824	923	1456	416	-842	908	1266	144
1945 FED FIRM SURPLUS/DEFICIT	2744	2892	2518	2836	1071	1147	3592	3458	4608	2312	1331
1946 FED FIRM SURPLUS/DEFICIT	6383	4181	4008	4602	2272	4551	3587	3498	4665	2529	1460
1947 FED FIRM SURPLUS/DEFICIT	5044	3218	3787	6868	4036	4354	3585	3454	4501	2470	1075
1948 FED FIRM SURPLUS/DEFICIT	7951	7510	4054	4494	2655	3020	3563	3651	4846	2866	1621
1949 FED FIRM SURPLUS/DEFICIT	2749	2895	2503	2832	728	2874	3582	3432	4529	2497	1261
1950 FED FIRM SURPLUS/DEFICIT	8138	6782	3771	5573	4670	4697	3598	3475	4573	2556	1356
1951 FED FIRM SURPLUS/DEFICIT	8211	4803	3376	6417	2328	4237	3559	3588	4748	2782	1580
1952 FED FIRM SURPLUS/DEFICIT	5661	2892	3693	4514	2985	2986	3614	3524	3797	1994	1156
1953 FED FIRM SURPLUS/DEFICIT	6068	5313	3697	4571	2212	2859	3589	3458	4495	2452	1228
1954 FED FIRM SURPLUS/DEFICIT	8348	8905	6053	4484	2856	3851	3570	3861	3980	3051	239
1955 FED FIRM SURPLUS/DEFICIT	7180	3513	3507	3415	3534	4690	3596	3442	4502	2452	1100
1956 FED FIRM SURPLUS/DEFICIT	6824	5633	2508	3164	1550	4274	3568	3606	4808	2819	1603
1957 FED FIRM SURPLUS/DEFICIT	2979	2892	3599	4539	2605	2659	3588	3639	4849	2595	1354
1958 FED FIRM SURPLUS/DEFICIT	3270	3533	3623	4382	2178	3931	3608	3440	4484	2483	1299
1959 FED FIRM SURPLUS/DEFICIT	6927	5413	7235	8708	5503	4514	3569	3537	4732	2802	1286
1960 FED FIRM SURPLUS/DEFICIT	6182	2941	3792	4850	1964	2793	3570	3468	4557	2562	1363
1961 FED FIRM SURPLUS/DEFICIT	3345	4417	3767	4505	2519	2408	3556	3830	5089	3246	1711
1962 FED FIRM SURPLUS/DEFICIT	5834	4648	3628	4771	1972	4461	3576	4026	4525	3183	469
1963 FED FIRM SURPLUS/DEFICIT	5483	4474	4102	4451	2232	2676	3594	3491	4611	2603	566
1964 FED FIRM SURPLUS/DEFICIT	7244	5169	3642	4879	2861	4685	3597	3526	4622	2580	1378
1965 FED FIRM SURPLUS/DEFICIT	8030	7392	3922	4659	2844	3448	3571	4081	4886	3174	1372
1966 FED FIRM SURPLUS/DEFICIT	6317	3601	3724	4409	2586	2435	3592	3444	4540	2509	-1
1967 FED FIRM SURPLUS/DEFICIT	7795	5291	3885	4014	2226	3119	3600	3739	5140	2263	155
1968 FED FIRM SURPLUS/DEFICIT	3443	5790	5498	6206	4300	4425	3584	3404	4528	2574	1420
1969 FED FIRM SURPLUS/DEFICIT	3604	2879	2515	3885	2076	2466	3559	4291	5608	3406	661
1970 FED FIRM SURPLUS/DEFICIT	2753	2891	2613	3586	2098	2742	3579	3353	4473	2280	1158
1971 FED FIRM SURPLUS/DEFICIT	8397	5528	2538	3523	1608	3883	3582	3367	4562	2638	1106
1972 FED FIRM SURPLUS/DEFICIT	8379	7810	2536	4108	2369	3733	3268	2399	900	-1443	-656
1973 FED FIRM SURPLUS/DEFICIT	2748	2890	2521	2831	264	4529	3599	3719	4595	2426	1010
1974 FED FIRM SURPLUS/DEFICIT	8403	6963	2766	4046	2321	2029	3587	3545	4744	1460	1268
1975 FED FIRM SURPLUS/DEFICIT	4457	5569	2533	4568	4015	4667	3609	3413	4512	2530	1322
1976 FED FIRM SURPLUS/DEFICIT	8367	8998	6994	4518	2616	3029	370	-1334	183	191	1207
1977 FED FIRM SURPLUS/DEFICIT	2877	3084	2434	2742	1126	2298	3527	3294	4554	2443	1262
1978 FED FIRM SURPLUS/DEFICIT	586	586	286	1636	286	-314	-564	-414	86	-1714	-1114

2011-12

OPERATING YEAR
RUN DATE: 03/05/93 MEDIUM LOAD
FORECAST

PEAK IN MEGAWATTS	AUG	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	A
UNADJUSTED	1-15	16-31								1-15	16
1929 FED FIRM SURPLUS/DEFICIT	5947	3081	3062	2635	1935	2885	-8	-462	455	618	1
1930 FED FIRM SURPLUS/DEFICIT	2825	2937	2166	1304	1494	1913	-290	-1641	111	1368	1
1931 FED FIRM SURPLUS/DEFICIT	4970	3752	2133	1446	1397	2416	-352	-1936	-565	3139	
1932 FED FIRM SURPLUS/DEFICIT	2009	2708	2065	950	254	1397	2687	3489	4020	3900	2
1933 FED FIRM SURPLUS/DEFICIT	4486	5277	3687	2672	1706	3196	3954	3652	4238	3839	2
1934 FED FIRM SURPLUS/DEFICIT	7622	6789	3531	3045	4789	4801	3972	3709	4346	4168	2
1935 FED FIRM SURPLUS/DEFICIT	3410	3363	3722	2367	1582	2898	3908	4294	2904	3033	2
1936 FED FIRM SURPLUS/DEFICIT	6410	3144	3706	2799	2475	3238	3553	2031	4005	4187	2
1937 FED FIRM SURPLUS/DEFICIT	3117	3006	3215	2913	2600	2882	-518	270	383	1691	1
1938 FED FIRM SURPLUS/DEFICIT	2091	2374	2118	1007	-903	1611	3946	3628	4359	4010	2
1939 FED FIRM SURPLUS/DEFICIT	2615	2588	3657	2974	2287	2739	2223	-1362	4583	5011	3
1940 FED FIRM SURPLUS/DEFICIT	4107	3167	3541	3098	2670	2968	2705	-848	4770	5824	3
1941 FED FIRM SURPLUS/DEFICIT	3740	3164	2229	1566	1642	2416	484	670	462	3822	2
1942 FED FIRM SURPLUS/DEFICIT	4660	4651	2108	1286	1877	4738	3919	4293	2565	4781	2
1943 FED FIRM SURPLUS/DEFICIT	5569	3713	3728	2949	1997	2989	3952	3722	4346	4178	2
1944 FED FIRM SURPLUS/DEFICIT	5914	2860	3303	2708	2387	2879	-343	-940	-781	1904	1
1945 FED FIRM SURPLUS/DEFICIT	2374	2288	2172	1059	492	1612	809	-585	683	2850	1
1946 FED FIRM SURPLUS/DEFICIT	2106	2225	2176	1071	639	1303	3985	3715	4383	3896	2
1947 FED FIRM SURPLUS/DEFICIT	5746	3514	3665	2837	1840	4707	3981	3755	4440	4114	2
1948 FED FIRM SURPLUS/DEFICIT	4407	2551	3445	5103	3604	4510	3979	3711	4277	4054	2
1949 FED FIRM SURPLUS/DEFICIT	7314	6844	3712	2730	2223	3176	3957	3908	4621	4450	2
1950 FED FIRM SURPLUS/DEFICIT	2111	2228	2161	1067	296	3030	3976	3689	4304	4082	2
1951 FED FIRM SURPLUS/DEFICIT	7501	6115	3429	3808	4238	4853	3992	3732	4348	4140	2
1952 FED FIRM SURPLUS/DEFICIT	7574	4136	3034	4652	1896	4393	3953	3845	4523	4366	2
1953 FED FIRM SURPLUS/DEFICIT	5024	2225	3351	2749	2554	3142	4008	3781	3572	3579	2
1954 FED FIRM SURPLUS/DEFICIT	5431	4646	3355	2806	1781	3015	3983	3715	4270	4037	2
1955 FED FIRM SURPLUS/DEFICIT	7711	8238	5711	2719	2424	4007	3963	4118	3755	4635	1
1956 FED FIRM SURPLUS/DEFICIT	6543	2847	3165	1650	3103	4846	3990	3699	4278	4036	2
1957 FED FIRM SURPLUS/DEFICIT	6187	4966	2166	1399	1118	4430	3962	3863	4583	4403	2
1958 FED FIRM SURPLUS/DEFICIT	2342	2225	3257	2775	2173	2815	3982	3896	4624	4180	2
1959 FED FIRM SURPLUS/DEFICIT	2633	2867	3281	2617	1747	4087	4002	3698	4259	4066	2
1960 FED FIRM SURPLUS/DEFICIT	6290	4746	6893	6943	5072	4670	3963	3794	4507	4386	2
1961 FED FIRM SURPLUS/DEFICIT	5545	2275	3450	3085	1533	2949	3963	3725	4332	4147	2
1962 FED FIRM SURPLUS/DEFICIT	2708	3751	3425	2740	2087	2564	3949	4087	4865	4830	2
1963 FED FIRM SURPLUS/DEFICIT	5197	3981	3286	3006	1541	4617	3970	4283	4300	4767	1
1964 FED FIRM SURPLUS/DEFICIT	4846	3807	3759	2686	1801	2832	3987	3748	4386	4188	1
1965 FED FIRM SURPLUS/DEFICIT	6607	4502	3299	3114	2430	4841	3991	3783	4398	4165	2
1966 FED FIRM SURPLUS/DEFICIT	7393	6725	3580	2894	2412	3604	3964	4338	4661	4759	2
1967 FED FIRM SURPLUS/DEFICIT	5680	2935	3381	2644	2155	2591	3986	3702	4315	4093	
1968 FED FIRM SURPLUS/DEFICIT	7158	4624	3543	2249	1794	3275	3994	3996	4915	3848	1
1969 FED FIRM SURPLUS/DEFICIT	2806	5123	5156	4442	3868	4581	3978	3662	4303	4158	2
1970 FED FIRM SURPLUS/DEFICIT	2967	2212	2172	2120	1645	2622	3953	4549	5383	4991	1
1971 FED FIRM SURPLUS/DEFICIT	2115	2224	2271	1821	1666	2898	3972	3610	4248	3865	2

1972 FED FIRM SURPLUS/DEFICIT	7760	4862	2196	1758	1177	4039	3976	3624	4337	4222	2091
1973 FED FIRM SURPLUS/DEFICIT	7742	7143	2194	2343	1938	3889	3662	2656	675	141	329
1974 FED FIRM SURPLUS/DEFICIT	2110	2223	2179	1066	-167	4685	3992	3976	4370	4010	1995
1975 FED FIRM SURPLUS/DEFICIT	7766	6296	2424	2281	1889	2185	3980	3802	4519	3044	2253
1976 FED FIRM SURPLUS/DEFICIT	3820	4903	2190	2803	3583	4823	4003	3670	4287	4114	2307
1977 FED FIRM SURPLUS/DEFICIT	7730	8332	6652	2753	2184	3185	763	-1076	-42	1775	2192
1978 FED FIRM SURPLUS/DEFICIT	2240	2417	2092	977	694	2454	3920	3552	4329	4027	2247
***Less PP&L contract**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**
***Less cold weather adjustment**					**-1400**	**-1500**	**-1500**	**-1500**			
***Less SOR 5b reduction**	**-1100**	**-1100**	**-1400**	**-50**	**0**	**-500**	**-750**	**-600**	**-1600**	**-3400**	**-2800**
***Add replacement of firm energy deficit**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**
***Add firm capacity to meet Fed firm energy loads at C-E ratio at .91**	**1584**	**1584**	**1584**	**1584**	**1584**	**1584**	**1584**	**1584**	**1584**	**1584**	**1584**

2011-12
OPERATING YEAR RUN
DATE: 03/05/93 MEDIUM LOAD FORECAST

PEAK IN MEGAWATTS	**AUG**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**	**JAN**	**FEB**	**MAR**	**APR**	**APR**
ADJUSTED	**1-15**	**16-31**								**1-15**	**16-30**
1929 FED FIRM SURPLUS/DEFICIT	**6631**	**3765**	**3446**	**4369**	**2319**	**2669**	**-474**	**-778**	**639**	**-998**	**705**
1930 FED FIRM SURPLUS/DEFICIT	**3509**	**3621**	**2550**	**3038**	**1878**	**1697**	**-756**	**-1957**	**295**	**-248**	**607**
1931 FED FIRM SURPLUS/DEFICIT	**5654**	**4436**	**2517**	**3180**	**1781**	**2200**	**-818**	**-2252**	**-381**	**1523**	**-167**
1932 FED FIRM SURPLUS/DEFICIT	**2693**	**3392**	**2449**	**2684**	**638**	**1181**	**2221**	**3173**	**4204**	**2284**	**1088**
1933 FED FIRM SURPLUS/DEFICIT	**5170**	**5961**	**4071**	**4406**	**2090**	**2980**	**3488**	**3336**	**4422**	**2223**	**1223**
1934 FED FIRM SURPLUS/DEFICIT	**8306**	**7473**	**3915**	**4779**	**5173**	**4585**	**3506**	**3393**	**4530**	**2552**	**1422**
1935 FED FIRM SURPLUS/DEFICIT	**4094**	**4047**	**4106**	**4101**	**1966**	**2682**	**3442**	**3978**	**3088**	**1417**	**1482**
1936 FED FIRM SURPLUS/DEFICIT	**7094**	**3828**	**4090**	**4533**	**2859**	**3022**	**3087**	**1715**	**4189**	**2571**	**1579**
1937 FED FIRM SURPLUS/DEFICIT	**3801**	**3690**	**3599**	**4647**	**2984**	**2666**	**-984**	**-46**	**567**	**75**	**875**
1938 FED FIRM SURPLUS/DEFICIT	**2775**	**3058**	**2502**	**2741**	**-519**	**1395**	**3480**	**3312**	**4543**	**2394**	**1146**
1939 FED FIRM SURPLUS/DEFICIT	**3299**	**3272**	**4041**	**4708**	**2671**	**2523**	**1757**	**-1678**	**4767**	**3395**	**2095**
1940 FED FIRM SURPLUS/DEFICIT	**4791**	**3851**	**3925**	**4832**	**3054**	**2752**	**2239**	**-1164**	**4954**	**4208**	**2872**
1941 FED FIRM SURPLUS/DEFICIT	**4424**	**3848**	**2613**	**3300**	**2026**	**2200**	**18**	**354**	**646**	**2206**	**1515**
1942 FED FIRM SURPLUS/DEFICIT	**5344**	**5335**	**2492**	**3020**	**2261**	**4522**	**3453**	**3977**	**2749**	**3165**	**1457**
1943 FED FIRM SURPLUS/DEFICIT	**6253**	**4397**	**4112**	**4683**	**2381**	**2773**	**3486**	**3406**	**4530**	**2562**	**1362**
1944 FED FIRM SURPLUS/DEFICIT	**6598**	**3544**	**3687**	**4442**	**2771**	**2663**	**-809**	**-1256**	**-597**	**288**	**981**
1945 FED FIRM SURPLUS/DEFICIT	**3058**	**2972**	**2556**	**2793**	**876**	**1396**	**343**	**-901**	**867**	**1234**	**113**
1946 FED FIRM SURPLUS/DEFICIT	**2790**	**2909**	**2560**	**2805**	**1023**	**1087**	**3519**	**3399**	**4567**	**2280**	**1301**
1947 FED FIRM SURPLUS/DEFICIT	**6430**	**4198**	**4049**	**4571**	**2224**	**4491**	**3515**	**3439**	**4624**	**2498**	**1429**
1948 FED FIRM SURPLUS/DEFICIT	**5091**	**3235**	**3829**	**6837**	**3988**	**4294**	**3513**	**3395**	**4461**	**2438**	**1044**
1949 FED FIRM SURPLUS/DEFICIT	**7998**	**7528**	**4096**	**4464**	**2607**	**2960**	**3491**	**3592**	**4805**	**2834**	**1591**
1950 FED FIRM SURPLUS/DEFICIT	**2795**	**2912**	**2545**	**2801**	**680**	**2814**	**3510**	**3373**	**4488**	**2466**	**1230**
1951 FED FIRM SURPLUS/DEFICIT	**8185**	**6799**	**3813**	**5542**	**4622**	**4637**	**3526**	**3416**	**4532**	**2524**	**1325**
1952 FED FIRM SURPLUS/DEFICIT	**8258**	**4820**	**3418**	**6386**	**2280**	**4177**	**3487**	**3529**	**4707**	**2750**	**1549**
1953 FED FIRM SURPLUS/DEFICIT	**5708**	**2909**	**3735**	**4483**	**2938**	**2926**	**3542**	**3465**	**3756**	**1963**	**1126**
1954 FED FIRM SURPLUS/DEFICIT	**6115**	**5330**	**3739**	**4540**	**2165**	**2799**	**3517**	**3399**	**4454**	**2421**	**1196**
1955 FED FIRM SURPLUS/DEFICIT	**8395**	**8922**	**6095**	**4453**	**2808**	**3791**	**3497**	**3802**	**3939**	**3019**	**208**
1956 FED FIRM SURPLUS/DEFICIT	**7227**	**3531**	**3549**	**3384**	**3487**	**4630**	**3524**	**3383**	**4462**	**2420**	**1069**
1957 FED FIRM SURPLUS/DEFICIT	**6871**	**5650**	**2550**	**3133**	**1502**	**4214**	**3496**	**3547**	**4767**	**2787**	**1573**
1958 FED FIRM SURPLUS/DEFICIT	**3026**	**2909**	**3641**	**4509**	**2557**	**2599**	**3516**	**3580**	**4808**	**2564**	**1324**

1959 FED FIRM SURPLUS/DEFICIT	**3317**	**3551**	**3665**	**4351**	**2131**	**3871**	**3536**	**3382**	**4443**	**2450**	1
1960 FED FIRM SURPLUS/DEFICIT	**6974**	**5430**	**7277**	**8677**	**5456**	**4454**	**3497**	**3478**	**4691**	**2770**	1
1961 FED FIRM SURPLUS/DEFICIT	**6229**	**2959**	**3834**	**4819**	**1917**	**2733**	**3497**	**3409**	**4516**	**2531**	1
1962 FED FIRM SURPLUS/DEFICIT	**3392**	**4435**	**3809**	**4474**	**2471**	**2348**	**3483**	**3771**	**5049**	**3214**	1
1963 FED FIRM SURPLUS/DEFICIT	**5881**	**4665**	**3670**	**4740**	**1925**	**4401**	**3504**	**3967**	**4484**	**3151**	
1964 FED FIRM SURPLUS/DEFICIT	**5530**	**4491**	**4143**	**4420**	**2185**	**2616**	**3521**	**3432**	**4570**	**2572**	
1965 FED FIRM SURPLUS/DEFICIT	**7291**	**5186**	**3683**	**4848**	**2814**	**4625**	**3525**	**3467**	**4582**	**2549**	1
1966 FED FIRM SURPLUS/DEFICIT	**8077**	**7409**	**3964**	**4628**	**2796**	**3388**	**3498**	**4022**	**4845**	**3143**	1
1967 FED FIRM SURPLUS/DEFICIT	**6364**	**3619**	**3765**	**4378**	**2539**	**2375**	**3520**	**3386**	**4499**	**2477**	
1968 FED FIRM SURPLUS/DEFICIT	**7842**	**5308**	**3927**	**3983**	**2178**	**3059**	**3528**	**3680**	**5099**	**2232**	
1969 FED FIRM SURPLUS/DEFICIT	**3490**	**5807**	**5540**	**6176**	**4252**	**4365**	**3512**	**3346**	**4487**	**2542**	1
1970 FED FIRM SURPLUS/DEFICIT	**3651**	**2896**	**2556**	**3854**	**2029**	**2406**	**3487**	**4233**	**5567**	**3375**	
1971 FED FIRM SURPLUS/DEFICIT	**2799**	**2908**	**2655**	**3555**	**2050**	**2682**	**3506**	**3294**	**4432**	**2249**	1
1972 FED FIRM SURPLUS/DEFICIT	**8444**	**5546**	**2580**	**3492**	**1561**	**3823**	**3510**	**3308**	**4521**	**2606**	1
1973 FED FIRM SURPLUS/DEFICIT	**8426**	**7827**	**2578**	**4077**	**2322**	**3673**	**3196**	**2340**	**859**	**-1475**	
1974 FED FIRM SURPLUS/DEFICIT	**2794**	**2907**	**2563**	**2800**	**217**	**4469**	**3526**	**3660**	**4554**	**2394**	
1975 FED FIRM SURPLUS/DEFICIT	**8450**	**6980**	**2808**	**4015**	**2273**	**1969**	**3514**	**3486**	**4703**	**1428**	1
1976 FED FIRM SURPLUS/DEFICIT	**4504**	**5587**	**2574**	**4537**	**3967**	**4607**	**3537**	**3354**	**4471**	**2498**	1
1977 FED FIRM SURPLUS/DEFICIT	**8414**	**9016**	**7036**	**4487**	**2568**	**2969**	**297**	**-1392**	**142**	**159**	1
1978 FED FIRM SURPLUS/DEFICIT	**2924**	**3101**	**2476**	**2711**	**1078**	**2238**	**3454**	**3236**	**4513**	**2411**	1

2012-13

OPERATING YEAR
RUN DATE: 03/05/93

PEAK IN MEGAWATTS	AUG	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	A
UNADJUSTED	1-15	16-31								1-15	16
1929 FED FIRM SURPLUS/DEFICIT	5835	2986	2945	2499	1783	2719	-186	-631	302	473	1
1930 FED FIRM SURPLUS/DEFICIT	2713	2841	2049	1168	1341	1747	-468	-1810	-42	1224	1
1931 FED FIRM SURPLUS/DEFICIT	4858	3656	2016	1310	1245	2249	-530	-2105	-718	2995	
1932 FED FIRM SURPLUS/DEFICIT	1898	2612	1948	815	102	1231	2509	3320	3867	3756	1
1933 FED FIRM SURPLUS/DEFICIT	4374	5181	3571	2536	1554	3030	3776	3483	4086	3695	2
1934 FED FIRM SURPLUS/DEFICIT	7510	6693	3415	2909	4637	4634	3794	3540	4193	4024	2
1935 FED FIRM SURPLUS/DEFICIT	3298	3267	3605	2231	1430	2732	3730	4125	2751	2889	2
1936 FED FIRM SURPLUS/DEFICIT	6298	3048	3589	2663	2323	3072	3375	1862	3852	4042	2
1937 FED FIRM SURPLUS/DEFICIT	3005	2911	3098	2777	2448	2716	-696	101	230	1547	1
1938 FED FIRM SURPLUS/DEFICIT	1980	2278	2001	872	-1055	1445	3768	3459	4206	3866	2
1939 FED FIRM SURPLUS/DEFICIT	2503	2493	3540	2838	2134	2572	2045	-1531	4430	4867	2
1940 FED FIRM SURPLUS/DEFICIT	3995	3072	3425	2962	2518	2801	2527	-1017	4617	5680	3
1941 FED FIRM SURPLUS/DEFICIT	3628	3068	2113	1430	1490	2250	306	501	309	3678	2
1942 FED FIRM SURPLUS/DEFICIT	4548	4555	1991	1150	1725	4571	3741	4124	2412	4637	2
1943 FED FIRM SURPLUS/DEFICIT	5457	3618	3611	2814	1845	2822	3774	3553	4193	4033	2
1944 FED FIRM SURPLUS/DEFICIT	5802	2765	3187	2572	2235	2712	-521	-1109	-934	1760	1
1945 FED FIRM SURPLUS/DEFICIT	2262	2192	2055	924	340	1445	631	-754	530	2706	
1946 FED FIRM SURPLUS/DEFICIT	1995	2130	2059	936	487	1136	3807	3546	4230	3752	2
1947 FED FIRM SURPLUS/DEFICIT	5634	3419	3549	2701	1688	4540	3803	3586	4287	3970	2
1948 FED FIRM SURPLUS/DEFICIT	4295	2455	3329	4967	3452	4343	3801	3542	4124	3910	1
1949 FED FIRM SURPLUS/DEFICIT	7202	6748	3596	2594	2071	3009	3779	3739	4468	4306	2
1950 FED FIRM SURPLUS/DEFICIT	2000	2133	2044	932	144	2863	3798	3520	4151	3937	2
1951 FED FIRM SURPLUS/DEFICIT	7389	6020	3312	3672	4086	4686	3814	3563	4196	3996	2

1952 FED FIRM SURPLUS/DEFICIT	7462	4041	2918	4516	1744	4227	3775	3676	4370	4222	2420
1953 FED FIRM SURPLUS/DEFICIT	4912	2130	3234	2613	2402	2975	3830	3612	3419	3434	1997
1954 FED FIRM SURPLUS/DEFICIT	5319	4551	3238	2670	1629	2848	3805	3546	4117	3892	2067
1955 FED FIRM SURPLUS/DEFICIT	7599	8143	5594	2584	2272	3841	3785	3949	3602	4491	1079
1956 FED FIRM SURPLUS/DEFICIT	6431	2751	3048	1514	2950	4679	3812	3530	4125	3892	1940
1957 FED FIRM SURPLUS/DEFICIT	6075	4871	2049	1263	966	4263	3784	3695	4430	4259	2444
1958 FED FIRM SURPLUS/DEFICIT	2230	2130	3141	2639	2021	2649	3804	3727	4471	4036	2195
1959 FED FIRM SURPLUS/DEFICIT	2521	2771	3164	2482	1595	3920	3824	3528	4106	3923	2139
1960 FED FIRM SURPLUS/DEFICIT	6178	4651	6776	6807	4920	4503	3785	3625	4354	4242	2126
1961 FED FIRM SURPLUS/DEFICIT	5433	2179	3333	2949	1381	2782	3785	3556	4179	4002	2203
1962 FED FIRM SURPLUS/DEFICIT	2596	3655	3308	2604	1935	2398	3771	3918	4711	4686	2551
1963 FED FIRM SURPLUS/DEFICIT	5085	3886	3169	2870	1388	4451	3792	4114	4147	4623	1309
1964 FED FIRM SURPLUS/DEFICIT	4734	3712	3643	2550	1649	2666	3809	3579	4233	4043	1406
1965 FED FIRM SURPLUS/DEFICIT	6495	4407	3183	2978	2278	4675	3813	3614	4245	4021	2219
1966 FED FIRM SURPLUS/DEFICIT	7281	6629	3463	2758	2260	3437	3786	4169	4508	4614	2212
1967 FED FIRM SURPLUS/DEFICIT	5568	2839	3265	2509	2003	2425	3808	3532	4162	3949	839
1968 FED FIRM SURPLUS/DEFICIT	7046	4528	3426	2113	1642	3108	3816	3827	4762	3704	996
1969 FED FIRM SURPLUS/DEFICIT	2694	5028	5040	4306	3716	4414	3800	3492	4150	4014	2260
1970 FED FIRM SURPLUS/DEFICIT	2855	2117	2056	1985	1492	2455	3775	4379	5230	4846	1502
1971 FED FIRM SURPLUS/DEFICIT	2004	2129	2155	1685	1514	2731	3794	3441	4095	3720	1998
1972 FED FIRM SURPLUS/DEFICIT	7648	4766	2079	1622	1024	3872	3798	3455	4184	4078	1946
1973 FED FIRM SURPLUS/DEFICIT	7630	7048	2077	2208	1786	3722	3484	2487	522	-3	184
1974 FED FIRM SURPLUS/DEFICIT	1999	2128	2062	931	-319	4518	3814	3807	4217	3866	1850
1975 FED FIRM SURPLUS/DEFICIT	7654	6201	2307	2145	1737	2019	3802	3633	4366	2900	2108
1976 FED FIRM SURPLUS/DEFICIT	3708	4807	2074	2667	3431	4656	3825	3501	4134	3970	2162
1977 FED FIRM SURPLUS/DEFICIT	7618	8236	6535	2617	2032	3019	585	-1246	-195	1631	2047
1978 FED FIRM SURPLUS/DEFICIT	2128	2321	1975	842	542	2287	3742	3382	4176	3883	2102
***Less PP&L contract**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**	**-1100**
***Less cold weather adjustment**					**-1400**	**-1500**	**-1500**	**-1500**			
***Less SOR 5b reduction**	**-1100**	**-1100**	**-1400**	**-50**	**0**	**-500**	**-750**	**-600**	**-1600**	**-3400**	**-2800**
***Add replacement of firm energy deficit**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**	**1300**
***Add firm capacity to meet Fed firm energy loads at C-E ratio of .92**	**1683**	**1683**	**1683**	**1683**	**1683**	**1683**	**1683**	**1683**	**1683**	**1683**	**1683**

2012-13											
OPERATING YEAR	**RUN**										
DATE: 03/05/93											
PEAK IN MEGAWATTS	**AUG**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**	**JAN**	**FEB**	**MAR**	**APR**	**APR**
ADJUSTED	**1-15**	**16-31**								**1-15**	**16-30**
1929 FED FIRM SURPLUS/DEFICIT	**6618**	**3769**	**3428**	**4332**	**2266**	**2602**	**-553**	**-848**	**585**	**-1044**	**659**
1930 FED FIRM SURPLUS/DEFICIT	**3496**	**3624**	**2532**	**3001**	**1824**	**1630**	**-835**	**-2027**	**241**	**-293**	**561**
1931 FED FIRM SURPLUS/DEFICIT	**5641**	**4439**	**2499**	**3143**	**1728**	**2132**	**-897**	**-2322**	**-435**	**1478**	**-213**
1932 FED FIRM SURPLUS/DEFICIT	**2681**	**3395**	**2431**	**2648**	**585**	**1114**	**2142**	**3103**	**4150**	**2239**	**1042**
1933 FED FIRM SURPLUS/DEFICIT	**5157**	**5964**	**4054**	**4369**	**2037**	**2913**	**3409**	**3266**	**4369**	**2178**	**1177**
1934 FED FIRM SURPLUS/DEFICIT	**8293**	**7476**	**3898**	**4742**	**5120**	**4517**	**3427**	**3323**	**4476**	**2507**	**1375**
1935 FED FIRM SURPLUS/DEFICIT	**4081**	**4050**	**4088**	**4064**	**1913**	**2615**	**3363**	**3908**	**3034**	**1372**	**1436**
1936 FED FIRM SURPLUS/DEFICIT	**7081**	**3831**	**4072**	**4496**	**2806**	**2955**	**3008**	**1645**	**4135**	**2525**	**1532**
1937 FED FIRM SURPLUS/DEFICIT	**3788**	**3694**	**3581**	**4610**	**2931**	**2599**	**-1063**	**-116**	**513**	**30**	**829**
1938 FED FIRM SURPLUS/DEFICIT	**2763**	**3061**	**2484**	**2705**	**-572**	**1328**	**3401**	**3242**	**4489**	**2349**	**1100**

1939 FED FIRM SURPLUS/DEFICIT	3286	3276	4023	4671	2617	2455	1678	-1748	4713	3350	2
1940 FED FIRM SURPLUS/DEFICIT	4778	3855	3908	4795	3001	2684	2160	-1234	4900	4163	2
1941 FED FIRM SURPLUS/DEFICIT	4411	3851	2596	3263	1973	2133	-61	284	592	2161	1
1942 FED FIRM SURPLUS/DEFICIT	5331	5338	2474	2983	2208	4454	3374	3907	2695	3120	1
1943 FED FIRM SURPLUS/DEFICIT	6240	4401	4094	4647	2328	2705	3407	3336	4476	2516	1
1944 FED FIRM SURPLUS/DEFICIT	6585	3548	3670	4405	2718	2595	-888	-1326	-651	243	
1945 FED FIRM SURPLUS/DEFICIT	3045	2975	2538	2757	823	1328	264	-971	813	1189	
1946 FED FIRM SURPLUS/DEFICIT	2778	2913	2542	2769	970	1019	3440	3329	4513	2235	1
1947 FED FIRM SURPLUS/DEFICIT	6417	4202	4032	4534	2171	4423	3436	3369	4570	2453	1
1948 FED FIRM SURPLUS/DEFICIT	5078	3238	3812	6800	3935	4226	3434	3325	4407	2393	
1949 FED FIRM SURPLUS/DEFICIT	7985	7531	4079	4427	2554	2892	3412	3522	4751	2789	1
1950 FED FIRM SURPLUS/DEFICIT	2783	2916	2527	2765	627	2746	3431	3303	4434	2420	1
1951 FED FIRM SURPLUS/DEFICIT	8172	6803	3795	5505	4569	4569	3447	3346	4479	2479	1
1952 FED FIRM SURPLUS/DEFICIT	8245	4824	3401	6349	2227	4110	3408	3459	4653	2705	1
1953 FED FIRM SURPLUS/DEFICIT	5695	2913	3717	4446	2885	2858	3463	3395	3702	1917	1
1954 FED FIRM SURPLUS/DEFICIT	6102	5334	3721	4503	2112	2731	3438	3329	4400	2375	1
1955 FED FIRM SURPLUS/DEFICIT	8382	8926	6077	4417	2755	3724	3418	3732	3885	2974	
1956 FED FIRM SURPLUS/DEFICIT	7214	3534	3531	3347	3433	4562	3445	3313	4408	2375	1
1957 FED FIRM SURPLUS/DEFICIT	6858	5654	2532	3096	1449	4146	3417	3478	4713	2742	1
1958 FED FIRM SURPLUS/DEFICIT	3013	2913	3624	4472	2504	2532	3437	3510	4754	2519	1
1959 FED FIRM SURPLUS/DEFICIT	3304	3554	3647	4315	2078	3803	3457	3311	4389	2406	1
1960 FED FIRM SURPLUS/DEFICIT	6961	5434	7259	8640	5403	4386	3418	3408	4637	2725	1
1961 FED FIRM SURPLUS/DEFICIT	6216	2962	3816	4782	1864	2665	3418	3339	4462	2485	1
1962 FED FIRM SURPLUS/DEFICIT	3379	4438	3791	4437	2418	2281	3404	3701	4994	3169	1
1963 FED FIRM SURPLUS/DEFICIT	5868	4669	3652	4703	1871	4334	3425	3897	4430	3106	
1964 FED FIRM SURPLUS/DEFICIT	5517	4495	4126	4383	2132	2549	3442	3362	4516	2526	
1965 FED FIRM SURPLUS/DEFICIT	7278	5190	3666	4811	2761	4558	3446	3397	4528	2504	1
1966 FED FIRM SURPLUS/DEFICIT	8064	7412	3946	4591	2743	3320	3419	3952	4791	3097	1
1967 FED FIRM SURPLUS/DEFICIT	6351	3622	3748	4342	2486	2308	3441	3315	4445	2432	
1968 FED FIRM SURPLUS/DEFICIT	7829	5311	3909	3946	2125	2991	3449	3610	5045	2187	
1969 FED FIRM SURPLUS/DEFICIT	3477	5811	5523	6139	4199	4297	3433	3275	4433	2497	1
1970 FED FIRM SURPLUS/DEFICIT	3638	2900	2539	3818	1975	2338	3408	4162	5513	3329	
1971 FED FIRM SURPLUS/DEFICIT	2787	2912	2638	3518	1997	2614	3427	3224	4378	2203	1
1972 FED FIRM SURPLUS/DEFICIT	8431	5549	2562	3455	1507	3755	3431	3238	4467	2561	1
1973 FED FIRM SURPLUS/DEFICIT	8413	7831	2560	4041	2269	3605	3117	2270	805	-1520	
1974 FED FIRM SURPLUS/DEFICIT	2782	2911	2545	2764	164	4401	3447	3590	4500	2349	
1975 FED FIRM SURPLUS/DEFICIT	8437	6984	2790	3978	2220	1902	3435	3416	4649	1383	1
1976 FED FIRM SURPLUS/DEFICIT	4491	5590	2557	4500	3914	4539	3458	3284	4417	2453	1
1977 FED FIRM SURPLUS/DEFICIT	8401	9019	7018	4450	2515	2902	218	-1463	88	114	1
1978 FED FIRM SURPLUS/DEFICIT	2911	3104	2458	2675	1025	2170	3375	3165	4459	2366	1

50-YEAR MEGAWATT DEFICITS (%) MONTH OF FEBRUARY

DEFICITS	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	HIGH LOAD 2009-10	2000 MW CO 2010-11
>0	18%	20%	20%	20%	20%	18%	20%	20%	20%	20%	20%	22%	22%	22%	22%	20%	22%
>-400	16%	18%	20%	20%	20%	16%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
>-800	16%	16%	18%	18%	18%	16%	18%	18%	18%	18%	20%	20%	20%	20%	20%	20%	20%
>-1200	12%	16%	16%	16%	16%	14%	16%	16%	16%	16%	20%	20%	20%	20%	20%	20%	20%
>-1600	8%	12%	14%	16%	14%	8%	16%	16%	16%	16%	18%	18%	18%	18%	18%	18%	18%
>-2000	4%	8%	10%	12%	10%	6%	12%	12%	12%	12%	16%	16%	16%	16%	16%	16%	16%

50-YEAR MEGAWATT DEFICITS (%) MONTH OF MARCH

DEFICITS	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	HIGH LOAD 2009-10	2000 MW CO 2010-11
>0	8%	14%	14%	18%	14%	0%	18%	14%	18%	18%	18%	18%	18%	18%	18%	18%	16%
>-400	4%	8%	8%	8%	8%	0%	8%	8%	18%	18%	14%	18%	18%	18%	18%	18%	16%
>-800	2%	4%	4%	4%	4%	0%	4%	4%	18%	18%	8%	8%	8%	14%	14%	8%	8%
>-1200	0%	2%	2%	4%	0%	0%	4%	2%	18%	18%	4%	4%	4%	8%	6%	6%	6%
>-1600	0%	0%	0%	0%	0%	0%	0%	0%	10%	18%	2%	4%	4%	4%	4%	4%	4%
>-2000	0%	0%	0%	0%	0%	0%	0%	0%	6%	14%	0%	0%	0%	0%	2%	0%	0%

50-YEAR MEGAWATT DEFICITS (%) MONTH OF APRIL 1-15

DEFICITS	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	HIGH LOAD 2009-10	2000 MW CO 2010-11
>0	12%	12%	12%	12%	12%	0%	12%	12%	12%	12%	12%	12%	12%	12%	14%	12%	12%
>-400	6%	10%	8%	12%	12%	0%	10%	10%	12%	6%	12%	12%	12%	12%	12%	12%	12%
>-800	4%	6%	4%	6%	6%	0%	6%	8%	10%	4%	10%	12%	12%	12%	12%	12%	12%
>-1200	4%	4%	4%	4%	4%	0%	4%	4%	6%	4%	6%	6%	6%	6%	6%	6%	6%
>-1600	2%	4%	2%	4%	4%	0%	4%	4%	4%	2%	4%	4%	4%	4%	4%	4%	4%
>-2000	0%	2%	0%	2%	2%	0%	2%	2%	2%	0%	4%	4%	4%	4%	4%	4%	4%

50-YEAR MEGAWATT DEFICITS (%) MONTH OF APRIL 16-30

DEFICITS	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	HIGH LOAD 2009-10	2000 MW CO 2010-11
>0	10%	20%	14%	20%	22%	0%	18%	18%	28%	22%	28%	44%	44%	42%	54%	36%	36%
>-400	6%	12%	8%	12%	12%	0%	12%	12%	14%	14%	18%	22%	22%	12%	22%	22%	20%
>-800	2%	4%	2%	4%	4%	0%	2%	2%	10%	6%	12%	12%	12%	12%	14%	12%	12%
>-1200	2%	2%	2%	2%	2%	0%	2%	2%	2%	2%	2%	6%	6%	4%	6%	4%	4%
>-1600	0%	0%	0%	0%	0%	0%	0%	0%	2%	0%	2%	2%	2%	2%	2%	2%	2%
>-2000	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

50-YEAR MEGAWATT DEFICITS (%) MONTH OF NOVEMBER

DEFICITS	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	HIGH LOAD 2009-10	2000 MW CO 2010-11
>0	2%	4%	4%	8%	6%	8%	8%	8%	2%	18%	14%	14%	14%	16%	14%	14%	14%
>-400	2%	2%	2%	4%	4%	4%	4%	4%	0%	14%	6%	10%	14%	14%	10%	8%	8%
>-800	0%	0%	2%	2%	2%	2%	2%	2%	0%	10%	4%	6%	6%	8%	4%	4%	4%
>-1200	0%	0%	0%	2%	0%	2%	2%	2%	0%	4%	2%	4%	4%	4%	2%	2%	2%

>-1600	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	2%	2%	2%	2%	2%	2%	2%	
>-2000	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	

50-YEAR MEGAWATT DEFICITS (%) MONTH OF DECEMBER																**HIGH LOAD**	**2000 MW CONTR**	
DEFICITS	**1994-95**	**1995-96**	**1996-97**	**1997-98**	**1998-99**	**1999-00**	**2000-01**	**2001-02**	**2002-03**	**2003-04**	**2004-05**	**2005-06**	**2006-07**	**2007-08**	**2008-09**	**2009-10**	**2010-11**	**201**
>0	0%	0%	0%	0%	0%	0%	0%	0%	0%	8%	8%	8%	10%	10%	8%	8%	8%	
>-400	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	0%	4%	4%	4%	4%	2%	2%	
>-800	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
>-1200	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
>-1600	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
>-2000	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	

50-YEAR MEGAWATT DEFICITS (%) MONTH OF JANUARY																**HIGH LOAD**	**2000 MW CONTR**	
DEFICITS	**1994-95**	**1995-96**	**1996-97**	**1997-98**	**1998-99**	**1999-00**	**2000-01**	**2001-02**	**2002-03**	**2003-04**	**2004-05**	**2005-06**	**2006-07**	**2007-08**	**2008-09**	**2009-10**	**2010-11**	**201**
>0	12%	16%	16%	14%	16%	12%	16%	16%	16%	16%	16%	18%	18%	18%	18%	18%	18%	
>-400	10%	12%	14%	14%	16%	10%	16%	16%	16%	16%	16%	16%	16%	16%	16%	16%	16%	
>-800	18%	10%	10%	10%	10%	8%	12%	14%	16%	16%	16%	16%	16%	16%	16%	16%	16%	
>-1200	0%	8%	10%	10%	10%	2%	10%	10%	10%	12%	16%	16%	16%	16%	16%	14%	16%	
>-1600	0%	0%	2%	8%	6%	0%	8%	10%	10%	10%	12%	16%	16%	16%	16%	14%	16%	
>-2000	0%	0%	0%	0%	0%	0%	2%	2%	6%	8%	10%	10%	12%	12%	10%	10%	10%	

Appendix E: System Operating Strategy (SOS) Alternatives

SOS 1 - PRE-ESA OPERATION

Objective: Base case operations without the various measures directed at anadromous fish or resulting from Endangered Species Act.

Discussion/Background: This SOS has two options.

SOS 1a (Pre-Salmon Summit Operation) represents operations as they existed from around 1983 through the 1990-91 operating year, prior to the recent listing of three species of salmon as endangered or threatened. Most analytical simulations use this operation as a base case.

SOS 1b (Optimum Load-Following Operation) represents operations as they existed prior to changes resulting from the Northwest Power Act. It attempts to optimize the load following capability of the system within certain constraints of reservoir operation. This operation is designed to demonstrate how much power could be produced if most flow-related operations to benefit anadromous fish were eliminated. It assumes that maximum fish transportation would be used to aid juvenile fish migration.

Requirements for SOS 1a: Water Budget - provide sufficient flow on the Columbia to meet a target of 134,000 cubic feet per second (cfs) at Priest Rapids. Draft water budget volume, up to maximum allowed from specific reservoirs (see below), as needed to attempt to meet an 85,000 cfs target at Lower Granite.

- Libby - assume no additional changes to Libby operations for the benefit of Kootenai white sturgeon.
- Vernita Bar - maintain a minimum flow at Priest Rapids to meet Vernita Bar Agreement.
- Upper Snake River operations - maintain operations as they existed in 1990-91; assumes no additional water volume from the Upper Snake river.
- Dworshak - draft up to 600 KAF (thousand acre-feet) from Dworshak in May for Water Budget; assume no system flood control transfer from Dworshak to Grand Coulee.
- Brownlee - draft up to 110 KAF in May for Water Budget; assume no system flood control transfer from Brownlee to Grand Coulee.
- Lower Snake Projects - operate the four lower Snake Projects within 3-5 feet of full pool.

Requirements for SOS 1b: Eliminate the following requirements - Water Budget, fish spill requirements, restrictions on operation of Bonneville's Second Powerhouse, refill targets at Libby, Hungry Horse, Grand Coulee, Dworshak and Albeni Falls, and fish-related rate of change on Snake River flows in May.

Keep the following operations the same as in the base case (**SOS 1a**) or as noted - Canadian project operations remain the same, Vernita Bar Agreement is met, the same energy content curves (ECCs) and variable energy content curves (VECCs) are used as in the base case, and current provisional drafting allowed.

- Libby - change minimum project flow to 3000 cfs, and meet summer draft limits (i.e., 5 to 10 feet).
- Hungry Horse - eliminate maximum flow restriction from mid-October through mid-November, and eliminate draft limit.
- Grand Coulee - eliminate requirement for 1240 feet elevation in May, meet 1285 feet elevation in July through September, and meet 1220 feet elevation limit.
- Upper Snake River operations - maintain operations as they existed in 1990-91; assumes no additional water volume from the Upper Snake river.
- Dworshak - meet minimum project flows (i.e., 2000 cfs, except in August, 1000 cfs), meet summer draft limits, and meet maximum discharge requirement October through November (i.e., 1300 cfs plus inflow).
- Lower Snake Projects - remove minimum flow limit (i.e., 11,500 cfs) during fall and winter.

Short-term Operation Requirements: Operate in the short term to meet power demands while satisfying non-power requirements.

- Flood Control - interpolate linearly between end of month flood control elevations on a daily basis. Load factoring is allowed within a specified forebay range.
- Vernita Bar Agreement - provide 55 kcfs (thousand cubic feet per second) during heavy load hours from October 15 through November. Provide instantaneous minimum flow of 70 kcfs from December through April.
- Priest Rapids - meet flow targets which are weekly averages with weekend and holiday flows no less than 80% of previous five days during May and June.
- Lower Snake River - provide maximum peaking capacity of 20 kcfs over day average flow during May.

SOS 2 - CURRENT OPERATIONS

Objective: Operations consistent with the final operations specified in the Corps of Engineers' 1993 Supplemental EIS.

Discussion/Background: This SOS represents an operation consistent with that specified in the Corps' 1993 Supplemental EIS. It is very similar to the way the system was operated during 1992 after three species of salmon were listed as threatened or endangered, and was the operation that resulted from Section 7 consultation with National Marine Fisheries Service (NMFS). One option under this SOS will be the no-action alternative in the SOR Draft EIS. This SOS has three options.

SOS 2a (Final Supplemental EIS Operation) will match exactly the decision made as the result of the Supplemental EIS with the exception that no Upper Snake water is included.

SOS 2b (Final Supplemental EIS Operation with new operations at Libby for sturgeon) includes additional operations at Libby to benefit the Kootenai white sturgeon which have been petitioned for listing under the Endangered Species Act.

SOS 2c (Final Supplemental EIS Operation - No-Action Alternative) matches exactly the decision made as a result of the Supplemental EIS, which includes up to 427 KAF of additional Upper Snake water.

Requirements for SOS 2a: Water Budget - provide both the existing water budget (Columbia and Snake Rivers) and an additional amount of water, up to 3 MAF (million acre-feet), based on a sliding scale tied to runoff forecasts for the Columbia, to aid anadromous fish migration. The additional water is stored in Grand Coulee and Arrow. These remain the same in all options under **SOS 2.**

- Libby - assume no additional changes to Libby operations for the benefit of Kootenai white sturgeon.
- Upper Snake - provide no Upper Snake water.
- Dworshak - provide supplemental releases as follows: (1) draft 900 KAF or more from April 16 to June 15, the exact volume depending on runoff forecast and flows at Lower Granite, and (2) draft up to 470 KAF above 1.2 kcfs minimum release from June 16 to August 31; shift system flood control to Grand Coulee for April - July runoff forecasts at Dworshak up to 3.0 MAF.
- Brownlee - draft up to 137 KAF in July (storage to be refilled with 137 KAF release from Upper Snake in August) and 100 KAF in September; shift system flood control to Grand Coulee.
- Lower Snake - operate to within 1 foot of minimum operating pool (MOP) from April 16 through July 31.
- John Day - lower reservoir to minimum irrigation pool (approximate elevation 262.5 feet) from April 1 to August 31; the pool would be held to this level unless it is necessary to raise it to avoid impacts to irrigation.

Requirements for SOS 2b: Same as **SOS 2a** with changed operation at Libby for sturgeon. Monthly elevation targets are established based on runoff forecast. The targets represent "Biological Rule Curves" which incorporate the natural resource needs of the project and attempt to allow outflows that benefit spawning of sturgeon at Bonner's Ferry.

- Libby - follow normal operation except from January through May, when additional operations are implemented for sturgeon, as follows: meet elevation targets based on January through July forecasts and four Biological Rule Curves - critical water (less than 5 MAF), low (5 to 6.5 MAF), medium (6.5 to 7.2 MAF) and high (greater than

7.2 MAF).
- Upper Snake - draft up to 190 KAF from April 16 through June 15 for flow augmentation, 137 KAF in August, and 100 KAF in September.
- Dworshak - provide supplemental releases as follows: (1) draft 900 KAF or more from April 16 to June 15, the exact volume depending on runoff forecast and flows at Lower Granite, and (2) draft up to 470 KAF above 1.2 kcfs minimum release from June 16 to August 31; shift system flood control to Grand Coulee for April - July runoff forecasts at Dworshak up to 3.0 MAF.
- Brownlee - draft up to 137 KAF in July (storage to be refilled with 137 KAF release from Upper Snake in August) and 100 KAF in September; shift system flood control to Grand Coulee.
- Lower Snake - operate to within 1 foot of MOP from April 1 to July 31.
- John Day - lower reservoir to minimum irrigation pool (approximate elevation 262.5 feet) from April 1 to August 31; the pool would be held to this level unless it is necessary to raise it to avoid impacts to irrigation.

Requirements for SOS 2c: Same as **SOS 2a** with the addition of 427 KAF of upper Snake River water.

- Libby - assume no additional changes to Libby operations for the benefit of sturgeon.
- Upper Snake - draft up to 190 KAF from April 16 through June 15 for flow augmentation, 137 KAF in August, and 100 KAF in September.
- Dworshak - provide supplemental releases as follows: (1) draft 900 KAF or more from April 16 to June 15, the exact volume depending on runoff forecast and flows at Lower Granite, and (2) draft up to 470 KAF above 1.2 kcfs minimum release from June 16 to August 31; shift system flood control to Grand Coulee for April - July runoff forecasts at Dworshak up to 3.0 MAF.
- Brownlee - draft up to 137 KAF in July (storage to be refilled with 137 KAF release from Upper Snake in August) and 100 KAF in September; shift system flood control to Grand Coulee.
- Lower Snake - operate to within 1 foot of MOP from April 1 to July 31.
- John Day - lower reservoir to minimum irrigation pool (approximate elevation 262.5 feet) from April 1 to August 31; the pool would be held to this level unless it is necessary to raise it to avoid impacts to irrigation.

Short-term Operation Requirements: Operate in the short-term to meet power demands while satisfying non-power requirements.

- Flood Control - interpolate linearly between end of month flood control elevations on a daily basis. Load factoring is allowed within a specified forebay range.
- Grand Coulee - provide flow augmentation while not limiting peaking ability of the project or other downstream Mid-Columbia projects. Month average flow changes may result in changes in 50-hour peaking at some projects.
- Vernita Bar Agreement - provide 55 kcfs during heavy load hours from October 15 through November. Provide instantaneous minimum flow of 70 kcfs from December through April.
- Priest Rapids - meet flow targets which are weekly averages with weekend and holiday flows no less than 80% of previous five days during May and June.
- Dworshak - provide instantaneous flows of not less than 1.2 kcfs or greater than 25 kcfs. Summer draft of 470 KAF, water budget and flood control shift are assumed to be released flat and not shapeable for power. Summer generation is shaped with no net drafts over a 1-week period.
- Lower Snake River - operate within 1 foot of minimum operating pool from April 16 through July.
- John Day - operate with 1.5 feet forebay range near 262.5 feet from May through August.

SOS 3 - FLOW AUGMENTATION

Objective: Monthly sustainable flow targets on the mainstem Snake and Columbia Rivers, to aid fish migration, based on April 1 forecast of the January through July volume runoff forecast.

Discussion/Background: This SOS attempts to set sustainable, realistic monthly flows targets based on expected runoff conditions. Early in the process it was determined that Dworshak has limited influence on Snake River flows. Therefore, rather than trying to regulate Lower Granite flows using just Dworshak storage, the decision was made to set monthly flow augmentation targets for Dworshak, and modify them if necessary based on Lower Granite flows.

Mid-Columbia flow targets however, are based upon the runoff forecast above Grand Coulee and are met with releases from Grand Coulee and Arrow dams. This SOS has two options.

SOS 3a (Monthly flow targets with no additional upper Snake water) will shape the currently assumed amount of water runoff through the year for fish.

SOS 3b (Monthly flow targets with additional upper Snake water) will shape the assumed amount of water runoff plus an additional 1.427 MAF from the Upper Snake Basin, obtained through irrigation water efficiency, rental, purchase, etc.

SOS 3a Requirements: Mid-Columbia - meet flow targets as follows. If the April 1 forecast of the January through July volume runoff above Grand Coulee is less than or equal to X, set the following flow targets (Qmins) at Priest Rapids at:

X	<= 50 MAF (kcfs)	<= 60 MAF (kcfs)	<= 70 MAF (kcfs)	> 70 MAF (kcfs)
April 1-15	80	100	120	140
April 16-30	80	120	140	140
May	140	140	140	140
June	130	130	130	130
July	115	115	115	115
August 1-15	80	90	100	110
August 16-31	80	90	100	110
September	-	-	-	-
October	95 (Qmax)	95 (Qmax)	95 (Qmax)	95 (Qmax)
November	95 (Qmax)	95 (Qmax)	95 (Qmax)	95 (Qmax)
December	70	70	70	70
January	70	70	70	70
February	70	70	70	70
March	70	70	70	70

(**Notes:** All values denote Qmins unless otherwise noted; VARQ overrides Qmaxs and Smin, Smin at Coulee is equal to 1208 feet all periods; use Arrow to store water and augment flows to the same extent used in SOS 2; Libby, Hungry Horse, and Albeni Falls are not affected by this operation).

- Dworshak - provide the following flows in the indicated month:
  September - Qmin of 5000 cfs, October through March - Qmin of 1200 cfs, April 1-15 - Qmin/Qmax of 2000 cfs, April 16-30 - Qmin/ Qmax of 4500 cfs, May - Qmin/Qmax of 15000 cfs, June - Qmin of 4725 cfs/Qmax of 7500, July - Qmin of 1200 cfs/Qmax of 5000 cfs, August - Qmin of 1200 cfs/Qmax of 5000 cfs. (**Notes:** Use VARQ flood control rule curves; VARQ will override Qmaxs; Qmins will override September Smin; back off Dworshak outflow in May if Lower Granite flows exceed 140 kcfs; back off Dworshak outflow in June if Lower Granite flows exceed 110 kcfs).

SOS 3b Requirements: This scenario operates the same as **SOS 3a**, except water from the upper Snake River above Brownlee (up to 1.427 MAF) is added as Brownlee inflows. Provide the additional flow as follows: October through March - reduce Brownlee inflows by 119 KAF each month (to recover one-half of the total volume provided during the spring/summer), April 16-30 - increase inflow to Brownlee by 285 KAF, May - increase inflow by 571 KAF, June -

increase inflow by 428 KAF, July - increase inflow by 143 KAF.

- Vernita Bar Agreement - provide 55 kcfs during heavy load hours from October 15 through November 30. Provide instantaneous minimum flow of 70 kcfs from December 1 through April 30.
- Priest Rapids - meet flow targets which are weekly averages with weekend and holiday flows no less than 80% of previous five days during May and June.
- Dworshak - provide instantaneous flows of not less than 1.2 kcfs or greater than 25 kcfs. Flow targets are weekly average outflows. Pulsing in concert with Lower Granite pulsing may be attempted.
- Lower Snake River - pulse flows from April 16 through June 30 by increasing Lower Granite outflow from 30 kcfs over inflow from 7 p.m. to 3 a.m. every third day if flows below 100 kcfs. If flows are above 100 kcfs, flows are increased up to but not above 130 kcfs. Refill occurs over the next 64 hours by reducing outflow to achieve a uniform hourly refill (approximately 3.75 kcfs). No flexibility for power operation at Lower Granite. Other three projects operate within 1 foot of minimum operating pool from April 16 through July 31.
- John Day - operate with 2 feet forebay range near 262.5 feet from April 16 through September 30.

Short-term Operation Requirements: Flood Control - interpolated linearly flood control elevation changes on a daily basis are between end of month elevations.

SOS 4 - STABLE STORAGE PROJECT OPERATION

Objective: Elevation targets at storage projects to address recreation, resident fish and wildlife needs.

Discussion/Background: This SOS attempts to coordinate operations at the various storage projects so that recreation, resident fish, wildlife, and anadromous fish uses are improved while minimizing the impact to power generation and flood control. Reservoirs are managed at specific elevation levels on a monthly basis. The goal is to minimize reservoir fluctuations while moving closer to natural flow conditions. This SOS has three options.

SOS 4a (Enhance Storage Level Operation) attempts to achieve specific monthly elevation targets year-round that improve the environmental conditions at the projects for recreation, resident fish, and wildlife, without regard to anadromous fish flows. There are two sub-options under **SOS 4a**. **SOS 4a1** meets Upper Rule Curves at Libby and Hungry Horse (elevations may be lower than the Biological Rule Curves). **SOS 4a3** meets Biological Rule Curves at Libby and Hungry Horse year-round instead of Upper Rule Curves.

SOS 4b (Compromise Storage Level Operation) is similar

to **SOS 4a** but attempts to accommodate anadromous fish needs by shaping mainstem flows to benefit migrations. There are two sub-options under **SOS 4b. SOS 4b1** meets Upper Rule Curves at Libby and Hungry Horse (elevations may be lower than the Biological Rule Curves). **SOS 4b3** meets Biological Rule Curves at Libby and Hungry Horse year-round instead of Upper Rule Curves.

SOS 4c (Enhance Storage Level Operation with Modified Grand Coulee Flood Control) is a combination of **SOS 4a** and **SOS 4b** that modifies flood control operation at Grand Coulee. The Biological Rule Curves at Libby and Hungry Horse are applied year-round, similar to **SOS 4b3**. Dworshak is operated similarly to

SOS 4a. Grand Coulee meets elevation targets in **SOS 4a** in all years instead of having the Upper Rule Curves apply. However, if the January-July forecast at the project is greater than 68 MAF, then the Upper Rule Curves apply.

Requirements for SOS 4a: Flood Control - use new modified flood control rule curves based on runoff forecasts.

- Libby - meet the following elevation targets by the end of the indicated month: September - 2458 feet (1 foot below full pool), October - no less than 2440, November - maximum flow of 16,000 cfs, December - 2411, January through May - elevation targets using monthly January through July forecasts and four Biological Rule Curves - critical water (less than

5 MAF), low (5 to 6.5 MAF), medium (6.5 to 7.2 MAF), and high (greater than 7.2 MAF), June through August -

2458.

- Hungry Horse - meet the following elevation targets by the end of the indicated month: September - 3559 feet (1 foot below full pool), October through December - Upper Rule Curves, January through April - elevation targets using monthly January through July forecasts and three elevation curves - low (less than 2 MAF), medium (2 to 2.5 MAF), and high (greater than 2.5 MAF), May - 3550 or on Upper Rule Curves, June through August - 3559.
- Grand Coulee - meet the following elevation targets by the end of the indicated month: September through November - 1288 feet (2 feet below full pool), December - 1287, January - 1270, February - 1260, March - 1270, April 1-15 - 1272, April 16-30 - 1275, May - 1280, June through August - 1288. Upper Rule Curves apply.
- Dworshak - meet the following elevation targets by the end of the indicated month: September through October - 1599 feet (1 foot below full pool), November through April - Upper Rule Curves, May - 1595, June through August - 1599.
- Albeni Falls - meet the following elevation targets by the end of the indicated month: September - 2060 feet (2.5 feet below full pool), October through March - 2056, April through May - between 2058 and 2062.5, June - 2062.5, July through August - 2060 but allow higher levels for flooding for 30 days; every sixth year, have 2051 feet as the October through March drawdown.

Requirements for SOS 4b: Flood Control - use new modified flood control rule curves based on runoff forecast.

- Libby - meet the following elevation targets by the end of the indicated month: September - 2458 feet (1 foot below full pool), October - no less than 2440, November - maximum flow of 16,000 cfs, December - 2411, January through May - elevation targets using monthly January through July forecasts and four Biological Rule Curves - critical water (less than

5 MAF), low (5 to 6.5 MAF), medium (6.5 to 7.2 MAF), and high (greater than 7.2 MAF), June through August - 2458.

- Hungry Horse - meet the following elevation targets by the end of the indicated month: September - 3559 feet (1 foot below full pool), October through December - Upper Rule Curves, January through April - elevation targets using monthly January through July forecasts and three elevation curves - low (less than 2 MAF), medium (2 to 2.5 MAF), and high (greater than 2.5 MAF), May - 3550 or on URC whichever is lower, June through August - 3559.
- Grand Coulee - meet the following elevation targets by the end of the indicated month: September - 1280 feet (10 feet below full), October - 1270, November - 1280, December - 1280, January through May - use the following targets if January through July forecast is less than

55 MAF, otherwise Upper Rule Curves: January - 1287, February - 1287, March - 1280, April 1-15 - 1278, April 16-30 - 1286, May - 1281, June through August - use first target if January through July forecast is

55 MAF or greater: June - 1288 or 1282, July - 1288 or 1281.5,

August 1-15 - 1286 or 1281, August 16-31 - 1285 or 1280.

- Dworshak - provide the following water budget volumes in the months indicated: September - 270 KAF, May through June - 900 KAF, and August - 200 KAF. Otherwise, operate at Upper Rule Curve elevations and minimum flows (i.e., 2000 cfs).
- Albeni Falls - meet the following elevation targets by the end of the indicated month: September - 2060 feet (2.5 feet below full pool), October - 2056 through March - 2056, April through May - between 2058 and 2062.5, June - 2062.5, July through August - 2060 but allow higher levels for flooding for 30 days; every sixth year, have

2051 feet as the October through March drawdown.

Requirements for SOS 4c: Flood Control - use new modified flood control rule curves based on runoff forecast where they apply.

- Libby - meet the following elevation targets by the end of the indicated month: September - 2458 feet (1 foot below full pool), October through December - elevation targets as specified by the four Biological Rule Curves, January through May - elevation targets using monthly January through July forecasts and four Biological Rule Curves - critical water (less than 5 MAF), low (5 to 6.5 MAF), medium (6.5 to 7.2 MAF), and high (greater than 7.2 MAF), June through August - 2458.
- Hungry Horse - meet the following elevation targets by the end of the indicated month: September - 3559 feet (1 foot below full pool), October through December - elevation targets as specified by the four Biological Rule Curves, January through April - elevation targets using monthly January through July forecasts and three elevation curves - low (less than 2 MAF), medium (2 to 2.5 MAF) and high (greater than 2.5 MAF),

May - 3550 or on Upper Rule Curve, whichever is lower, June through

August - 3559.

- Grand Coulee - meet the following elevation targets by the end of the indicated month: September through November - 1288 feet (2 feet below full pool), December - 1287, January - 1270, February - 1260, March - 1270, April 1-15 - 1272, April 16-30 - 1275, May - 1280, June through August - 1288. Upper Rule Curves apply only when January through July runoff forecast is greater than 68 MAF.
- Dworshak - meet the following elevation targets by the end of the indicated month: September through October - 1599 feet (1 foot below full pool), November through April - Upper Rule Curves, May - 1595, June through August - 1599.
- Albeni Falls - meet the following elevation targets by the end of the indicated month: September - 2060 feet (2.5 feet below full pool), October through March - 2056, April through May - between 2058 and 2062.5, June - 2062.5, July through August - 2060 but allow higher levels for flooding for 30 days; every sixth year; have

2051 feet as the October through March drawdown.

Short-term Operation Requirements: Flood Control - interpolated linearly flood control elevation changes on a daily basis between end of month elevations. Flood control curves are maximum elevations and Biological Rule Curves are minimum elevations. When these two elevation requirements reduce forebay range to less than 2 feet, then operation will be within a 2-foot range (1 foot at Albeni Falls) with load factoring not to exceed 1 foot in any 24-hour period.

- Libby - operate at 16 kcfs in November as an instantaneous maximum rather than a daily average.
- Sturgeon Flows - provide flow for sturgeon during the 6-week high flow period as instantaneous requirements. No load factoring is allowed when 15, 25, or 35 kcfs flows are being provided. Under critical water conditions, normal operation and load factoring is possible. During ramp up and ramp down periods, hourly ramp rates are not exceeded. Load factoring is allowed above a minimum flow of 11 kcfs at Bonner's Ferry during July and August. During ramp up, load factoring is limited to

5 kcfs in any 24-hour period. During ramp down, no load factoring allowed.

- Vernita Bar Agreement - for **SOS 4b**, meet the requirements of the agreement which limit the amount nighttime flows can be backed down. For **SOS 4a**, no restrictions are imposed by the agreement.
- Priest Rapids - for **SOS 4b**, meet flow targets which are weekly averages with weekend and holiday flows no less than 80% of previous five days during May and June. For **SOS 4a,** this restriction does not apply.
- Dworshak - provide instantaneous flows of not less than 1.2 kcfs or greater than 25 kcfs. Summer generation is shaped with no net drafts over 1-week periods.
- Lower Snake River - operate within 1 foot of minimum operating pool from April 16 through July.
- John Day - operate within 2 feet forebay range near 263.5 feet November 1 through June 30.

SOS 5 - NATURAL RIVER OPERATION

Objective: Reduce four lower Snake Projects' operating elevations to near river bed with new outlets.

Discussion/Background: This SOS represents an operation that attempts to aid anadromous fish by speeding water

particle travel time. This is done by installing new outlets in the lower Snake River dams, permitting the lowering of reservoirs to near the original riverbed levels. This SOS has two options.

SOS 5a (Two Month Natural River Operation) assumes the drawdown lasts for 2 months. Drawdown begins on April 16.

SOS 5b (Four and One-Half Month Natural River Operation) assumes the drawdown lasts for 4½ months. Drawdown begins on April 16.

Requirements for SOS 5a and 5b: Flow augmentation on Columbia River - provide 3.45 MAF water budget and up to 3.0 MAF additional water under low runoff conditions.

- Upper Snake River - maintain operations as they existed in 1990-91; assume no additional water volume from the Upper Snake river.
- · Dworshak - remove from proportional draft for power and operate to local flood control rule curves with system flood control shifted to lower Snake projects; draft to refill lower Snake projects if natural inflow is inadequate for refill.
- Lower Snake projects - drawdown to the following elevations from

April 16 through June 15 in **SOS 5a** and from April 16 through

August 31 in **SOS 5b**:

Lower Granite	623 feet
Little Goose	524 feet
Lower Monumental	432 feet
Ice Harbor	343 feet

- Refill - use a combination of natural flows and storage releases while meeting minimum flows at lower Snake projects.
- John Day - lower reservoir elevation to 257 feet from May through August.

Short-term Operation Requirements: Flood Control - interpolate linearly flood control elevation changes on a daily basis between end of month elevations. Load factoring is allowed within a specified forebay range.

- Grand Coulee - provide flow augmentation while not limiting peaking ability of the project or other downstream Mid-Columbia projects. Month average flow changes may result in changes in 50-hour peaking at some projects.
- Vernita Bar Agreement - provide 55 kcfs during heavy load hours from October 15 through November. Provide instantaneous minimum flow of 70 kcfs from December through April.
- Priest Rapids - provide flow targets which are weekly averages with weekend and holiday flows no less than 80% of previous five days during May and June.
- Dworshak - provide instantaneous flows of not less than 1.2 kcfs or greater than 25 kcfs. Operate on flood control rule curve from January through July but do not violate minimum flow. Project can be used for short periods to meet firm peak loads.
- Lower Snake River - draft to natural river levels at a rate of 2 feet per day starting on February 18 with little daily fluctuations for daytime power production. Generation is lost once projects are more than 50 feet below normal operating levels. Projects are refilled by reducing outflow to minimum at most downstream projects and passing inflow at upper projects, working upstream as each project fills.
- John Day - operate within 1.5 feet forebay range near 257 feet from May through August.

SOS 6 - FIXED DRAWDOWN

Objective: Reduce four Lower Snake River projects' operating elevations to below minimum operating pool.

Discussion/Background: This SOS represents an operation that attempts to aid anadromous fish by speeding water particle travel time. This SOS has four options.

SOS 6a (2-Month Fixed Drawdown Operation) draws down all four reservoirs for 2 months.

SOS 6b (4½-Month Fixed Drawdown Operation) draws down all four reservoirs for 4½ months.

SOS 6c (2-Month Lower Granite Drawdown Operation) draws down Lower Granite project only for 2 months.

SOS 6d (4½-Month Lower Granite Drawdown Operation) draws down Lower Granite project only for 4½ months.

Requirements for SOS 6a and 6b: Flow augmentation on Columbia River - provide 3.45 MAF water budget and up to 3.0 MAF additional water under low runoff conditions.

- Upper Snake River operations - maintain operations as they existed in 1990-91; assume no additional water volume from the Upper Snake River.
- · Dworshak - remove from proportional draft for power and operate to local flood control rule curves with system flood control shifted to Lower Snake projects; draft to refill Lower Snake projects if natural inflow is inadequate for refill.
- Lower Snake River Projects - drawdown to the following elevations from April 16 through June 15 in **SOS 6a** and from April 16 through August 31 in **SOS 6b**:

Lower Granite	705 feet
Little Goose	605 feet
Lower Monumental	507 feet
Ice Harbor	407 feet

- Refill - use a combination of natural flows and storage releases while meeting minimum flows at Lower Snake projects.
- John Day - lower reservoir elevation to 257 feet from May through August

Requirements for SOS 6c and 6d: Flow augmentation on Columbia River - provide 3.45 MAF water budget and up to 3.0 MAF additional water under low runoff conditions.

- Upper Snake River operations - maintain operations as they existed in 1990-91; assume no additional water volume from the Upper Snake River.
- · Dworshak - remove from proportional draft for power and operate to local flood control rule curves with system flood control shifted to Lower Snake projects; draft to refill Lower Snake projects if natural inflow is inadequate for refill.
- Lower Granite Project - drawdown to 705 feet from April 16 through

June 15 in **SOS 6c** and from April 16 through August 31 in **SOS 6d**.

- Refill - use a combination of natural flows and storage releases while meeting minimum flows at lower Snake projects.
- John Day - lower reservoir elevation to 257 feet from May through August

Short-term Operation Requirements: Flood Control - interpolate linearly flood control elevation changes on a daily basis between end of month elevations. Load factoring is allowed within a specified forebay range.

- Grand Coulee - provide flow augmentation while not limiting peaking ability of the project or other downstream Mid-Columbia projects. Month average flow changes may result in changes in 50-hour peaking at some projects.

Vernita Bar Agreement - provide 55 kcfs during heavy load hours from October 15 through November. Provide instantaneous minimum flow of 70 kcfs from December through April.

- Priest Rapids - provide flow targets which are weekly averages with weekend and holiday flows no less than 80% of previous five days during May and June.
- Dworshak - provide instantaneous flows of not less than 1.2 kcfs or greater than 25 kcfs. Operate on flood control rule curve from January through July but do not violate minimum flow. Project can be used for short periods to meet firm peak loads.
- Lower Snake River - draft to drawdown level at a rate of 2 feet per day starting on April 1 with little daily fluctuation for daytime power production. Once drawdown level is reached, projects operate over 5-foot forebay range. Projects are refilled by reducing outflow to minimum at most downstream projects and passing inflow at upper projects, working upstream as each project fills.
- John Day - operate within 1.5 feet of forebay range near 257 feet from May through August.

SOS 7 - FEDERAL RESOURCE AGENCIES ALTERNATIVES

Objective: Provide increased flows for anadromous fish by establishing flow targets during the migration period.

Discussion/Background: This SOS represents operations suggested by the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) as cooperating agencies. They provide increased flows for anadromous fish. The USFWS option recognizes the needs of other listed species and the natural resources in the basin. It represents the Coordination Act Report operation suggested in the Corps of Engineers' Supplemental Flow Options/Analysis EIS. The NMFS options are based on the incidental take statement flow targets and the conservation recommendations contained in the Biological Opinion on 1993 Operations. This SOS has three options.

SOS 7a (Coordination Act Report Operation) establishes flow targets at The Dalles based the previous year's end-of-year storage content similar to how PNCA selects operating rule curves. Specific volumes of releases are made from Dworshak, Brownlee, and the Upper Snake River to try to meet Lower Granite flow targets. Biological Rule Curves similar to **SOS 4** are applied at Hungry Horse and Libby. Specific elevations and spill percentages are established at run-of-river projects.

SOS 7b (Incidental Take Statement Flow Targets) establishes flow targets at McNary and Lower Granite during the April through July period.

SOS 7c (NMFS Conservation Recommendations) establishes flow targets somewhat higher than **SOS 7b** at McNary and Lower Granite during the April through July period.

Requirements for SOS 7a: Flood Control - use new modified flood control rule curves based on runoff forecast where appropriate.

- Libby - meet the following elevation targets by the end of the indicated month: September - 2458 feet (1 foot below full pool), October - no less than 2440, November - maximum flow of 16,000 cfs, December - 2411, January through May - elevation targets using monthly January through July forecasts and four Biological Rule Curves - critical water (less than

5 MAF), low (5 to 6.5 MAF), medium (6.5 to 7.2 MAF), and high (greater than 7.2 MAF), June through August - 2458. Upper Rule Curves do not apply.

- Hungry Horse - meet the following elevation targets by the end of the indicated month: September - 3559 feet (1 foot below full pool), October through December - Upper Rule Curves, January through April - elevation targets using monthly January through July forecasts and three elevation curves - low (less than 2 MAF), medium (2 to 2.5 MAF), and high (greater than 2.5 MAF), May - 3550, June through August - 3559. Upper Rule Curves do not apply during the January through May period.
- Grand Coulee - do not violate flood control, Vernita Bar, or local requirements. April through August - operate to meet flow targets at The Dalles according to the following table. The targets are selected using the previous August end-of-month storage content for Grand Coulee and Arrow combined - first year (greater than 5000 ksfd

[thousand second-foot days]), second year (between 4000 and 5000), and third/fourth year (less than 4000 ksfd).

Flow Targets - The Dalles

Period	1st Year	2nd Year	3rd & 4th Year
April 16 -June 15	300 kcfs	260 kcfs	220 kcfs
June 16 - Jule 31	200 kcfs	200 kcfs	200 kcfs
August 1 - August 15	160 kcfs	160 kcfs	160 kcfs
August 16 - August 31	160 kcfs	any level	any level

- Brownlee - draft up to 137 KAF in July through August 15; draft

100 KAF in September; shift system flood control to Grand Coulee.

- Upper Snake River - provide additional flows as indicated:

April 16 through June - 1.2 kcfs flow augmentation over minimum flow and flood control releases (180 KAF), July through August 15 - 7 kcfs flow augmentation over normal daily operation (637 KAF).

- · Dworshak - remove from proportional draft for power and operate to Upper Rule Curves with system flood control shifted to Grand Coulee. Maintain flow at minimum (1200 cfs) in all months except when additional releases are needed to provide flow augmentation or flood control. Provide additional flows as indicated: April 16 through

June 30 - 10 kcfs flow augmentation over minimum flow and flood control releases (1.5 MAF), July through August 15 - 4.4 kcfs flow augmentation over normal operation (400 KAF). Maximum flow is 25,000 cfs. Flow releases can be reduced if the following flows are obtained at Lower Granite:

Period	Flow
April 16 - June 15	120 kcfs
June 16 - June 30	110 kcfs
July 1 - July 31	80 kcfs
August 1 - August 31	50 kcfs

- Lower Granite - operate at the following elevations: September through November - within 1 foot of MOP, December through March - normal operation, April 1-15 - within 1 foot of MOP, April 16 through

June - 710 feet, July - 719 feet, August 1-31 - within 1 foot of MOP. Provide spill percentages (over a 12-hour period) of 78% and 77% for spring (April 16 - June 15) and fall (June 16 - August 31) fish respectively. Nighttime flows to which this spill percentage is applied are 80% of the daytime flows or 44.5% of the total monthly flows.

- Other Lower Snake projects - operate within 1 foot of MOP from April through November, normal operation for remainder of the year. Provide spill percentages (over a 12-hour period) as indicated. Nighttime flows to which the spill percentages are applied are 80% of the daytime flows or 44.5% of the total monthly flows.

Project	Spring	Fall
Little Goose	48%	77%
Lower Monumental	61%	81%

Ice Harbor	54%	81%

- McNary - provide spill percentages (over a 12-hour period) of 48% and 62% for spring (April 16 - June 15) and fall (June 16 - August 31) fish, respectively. Nighttime flows to which this spill percentage is applied are 80% of the daytime flows or 44.5% of the total monthly flows.
- John Day - lower reservoir elevation to 262.5 feet with 1 foot of flexibility from April through June and to 264.2 feet with 1 foot of flexibility from July through August

Requirements for SOS 7b: Flood Control - use new modified flood control rule curves based on runoff forecast where appropriate.

- Libby and Hungry Horse - operate as in **SOS 2a** or **SOS 2c** except draft reservoirs as necessary to help meet flow targets at McNary.
- Grand Coulee and Arrow - draft to meet the following flow targets at McNary in combination with the flows from the Snake River:

Period	**Flow**
April 20 - June 30	200 kcfs
July 1 - July 31	160 kcfs

- Upper Snake - provide no Upper Snake water.
- Dworshak - draft to meet the following flow targets at Lower Granite in combination with the flows from Brownlee:

Period	**Flow**
April 10 - June 20	85 kcfs
June 21 - July 31	50 kcfs

- Brownlee - draft up to 137 KAF in July (storage to be refilled with

137 KAF release from Upper Snake in August) and 100 KAF in September; shift system flood control to Grand Coulee.

- Lower Snake - operate to within 1 foot of MOP from April 16 through July 31.
- John Day - lower reservoir to minimum irrigation pool (approximate elevation 262.5 feet) from April 1 to August 31; the pool would be held to this level unless it is necessary to raise it to avoid impacts to irrigation.

Requirements for SOS 7c: Flood Control - use new modified flood control rule curves based on runoff forecast where appropriate.

- Libby and Hungry Horse - operate as in **SOS 2a** or **SOS 2c** except draft reservoirs as necessary to help meet flow targets at McNary.
- Grand Coulee and Arrow - draft to meet the following flow targets at McNary in combination with the flows from the Snake River:

Period	**Flow**
April 20 - June 30	220 kcfs
July 1 - July 31	200 kcfs

- Upper Snake - provide no Upper Snake River water.

- Dworshak - draft to meet the following flow targets at Lower Granite in combination with the flows from Brownlee:

Period	**Flow**
April 10 - June 20	85 kcfs
June 21 - July 31	55 kcfs

- Brownlee - draft up to 137 KAF in July (storage to be refilled with

137 KAF release from Upper Snake River in August) and 100 KAF in September; shift system flood control to Grand Coulee.

- Lower Snake - operate to within 1 foot of MOP from April 16 through July 31.
- John Day - lower reservoir to minimum irrigation pool (approximate elevation 262.5 feet) from April 1 to August 31; the pool would be held to this level unless it is necessary to raise it to avoid impacts to irrigation.

Short-term Operation Requirements: Flood Control - interpolate linearly flood control elevation changes on a daily basis between end of month elevations. Load factoring is allowed within a specified forebay range.

- Grand Coulee - provide flows while not limiting peaking ability of the project or other downstream Mid-Columbia projects. Month average flow changes may result in changes in 50-hour peaking at some projects.
- Vernita Bar Agreement - provide 55 kcfs during heavy load hours from October 15 through November. Provide instantaneous minimum flow of 70 kcfs from December through April.
- Flow Targets - provide flow targets which are biweekly averages with weekend and holiday flows no less than 80% of previous five days.
- Dworshak - provide instantaneous flows of not less than 1.2 kcfs or greater than 25 kcfs. Operate on flood control rule curve from January through July but do not violate minimum flow or targets.
- Spill - provide the spill during the nighttime hours. Nighttime flows are assumed to be no lower than 80% of the daytime flows. This assumption results in spill over a 12-hour period of just over twice the amount shown for monthly spill.

Appendix F: PacifiCorp Resources

Thermal Plants Owned and Operated by PacifiCorp

Blundell Plant

Maximum Nameplate Rating: 26 MW

Location: Beaver County, Utah, 23 miles southwest of Milford.

Fuel: Geothermal steam from adjacent well field.

Plant Description: One unit; commercial operation in 1984. Geothermal fluid from well is flashed; steam portion goes through the turbine; condensate and excess brine are reinjected into wells.

Plant Location Description: Blundell Plant is located in a remote area of geothermal activity. The plant emits hydrogen sulfide vapors. The plant is located in an air attainment area.

Carbon Plant

Maximum Nameplate Rating: 189 MW

Location: Carbon County, Utah, 5 miles north of Helper.

Fuel: Bituminous Coal, 11,800 BTU/lb, 9.0% ash, 0.5% sulfur (0.81 lb SO2/MMBTU)

Plant Description: Two units; commercial operation in

1954 and 1957; each unit has a tangentially-fired boiler with electrostatic precipitator, mechanical draft cooling towers with NPDES (national pollutant discharge elimination system) discharge to Price River.

Plant Location Description: Carbon Plant is located in a canyon along U.S. Highway 6, next to the Price River. Originally designed as a mine mouth plant, fuel is now received by truck from Carbon and Emery County mines. The plant is located in an air attainment area.

Centralia Plant

Maximum Nameplate Rating: 1460 MW

Location: Lewis County, Washington, 5 miles north of Centralia.

Fuel: Sub-bituminous coal, 8000 BTU/lb, 14.4% ash, 0.65% sulfur (1.6 lb SO2/MMBTU).

Plant Description: Two units; commercial operation in 1972 and 1973; each unit has a tangentially-fired divided-wall boiler with two electrostatic precipitators, mechanical draft cooling towers with NPDES discharge through a series of ponds to Big Hanaford Creek.

Plant Location Description: Centralia Plant is located in Hanaford Valley adjacent to the Centralia Coal Mine. Originally designed as a mine mouth plant, supplemental lower sulfur coal is also received by rail from Rocky Mountain states. The plant is located in an air attainment area.

Dave Johnston Plant

Maximum Nameplate Rating: 817 MW

Location: Converse County, Wyoming, 4 miles east of Glenrock.

Fuel: Sub-bituminous coal, 7800 BTU/lb, 8.9% ash, 0.4% sulfur (1.0 lb SO2/MMBTU).

Plant Description: Four units; commercial operation in 1959, 1960, 1964, and 1972. Units 1, 2 and 3 have wall-fired boilers with electrostatic precipitators, once-through condenser cooling with mechanical draft cooling towers that operate during summer with NPDES discharge into the North Platte River. Unit 4 has a tangentially-fired boiler and a wet venturi scrubber for particulate and SO2 control, mechanical cooling towers for condenser cooling, and NPDES discharge from ash ponds.

Plant Location Description: Dave Johnston Plant is located along I-25 beside the North Platte River. Originally designed as a captive mine plant, supplemental lower sulfur coal is also received by rail from mines in the Powder River Basin of Wyoming. The plant is located in an air attainment area.

Gadsby Plant

Maximum Nameplate Rating: 252 MW; Unit 3 in operation, Units 1 and 2 out of service.

Location: 1407 W. N. Temple, Salt Lake City, Utah, in Salt Lake County.

Fuel: Natural gas.

Plant Description: Three units; commercial operation in 1951, 1952, and 1955. Units 1, 2 have wall-fired boilers with mechanical draft cooling towers. Unit 3 has a tangentially-fired boiler with mechanical draft cooling tower. The plant has an NPDES discharge permit into the Jordan River. Electrostatic precipitators are installed on units 2 and 3, but are not used for gas operation.

Plant Location Description: Gadsby Plant is located west of downtown Salt Lake City, beside the Jordan River. The plant is located in an air non-attainment area for PM-10. Utah's state implementation plan (SIP) requires that Gadsby Plant burn natural gas and limits the tons-per-year emissions of PM-10, SO2 and NOx.

Hunter Plant

Maximum Nameplate Rating: 1210 MW

Location: Emery County, Utah, 2 miles south of Castle Dale.

Fuel: Bituminous coal, 11,500 BTU/lb, 12.7% ash, 0.48% sulfur (0.8 lb SO2/MMBTU).

Plant Description: Three units; commercial operation in 1978, 1980, and 1983. Units 1 and 2 are tangentially-fired boilers with electrostatic precipitators and wet lime flue gas desulfurization (FGD) systems operating at 0.15 lb SO2/MMBTU. Unit 3 is a wall-fired boiler with low-NOx burners, a baghouse for particulate control and a wet lime FGD system operating at 0.12 lb SO2/MMBTU. Each unit has mechanical draft cooling towers and the plant is zero-discharge for waste water.

Plant Location Description: Hunter Plant is located in a broad valley. Coal is received by truck from nearby dedicated coal mines. The plant is located in an air attainment area. Units 1 and 2 must comply with Subpart D of the New Source Performance Standards (NSPS). Unit 3 complies with Subpart Da of the NSPS.

Huntington Plant

Maximum Nameplate Rating: 893 MW

Location: Emery County, Utah, 7 miles west of Huntington.

Fuel: Bituminous coal, 11,500 BTU/lb, 12.7% ash, 0.42% sulfur (0.7 lb SO2/MMBTU).

Plant Description: Three units; commercial operation in 1977 and 1974. The units have tangentially-fired boilers with electrostatic precipitators. Unit 1 has a wet lime FGD system operating at 0.15 lb SO2/MMBTU. Each unit has mechanical draft cooling towers and the plant is zero-discharge for waste water.

Plant Location Description: Huntington Plant is located in a canyon beside Huntington Creek. Coal is received from an adjacent coal mine. The plant is located in an air attainment area.

Unit 1 must comply with Subpart D of the New Source Performance Standards (NSPS).

Jim Bridger Plant

Maximum Nameplate Rating: 2242 MW

Location: Sweetwater County, Wyoming, 35 miles east of Rock Springs.

Fuel: Sub-bituminous coal, 9600 BTU/lb, 10% ash, 0.6% sulfur (1.32 lb SO2/MMBTU)

Plant Description: Four units; commercial operation in 1974, 1975, 1976, and 1979. Each unit has a tangentially-fired boiler, electrostatic precipitator, and wet sodium FGD system operating at 0.3 lb SO2/MMBTU (0.2 for Unit 4). Each unit has mechanical draft cooling towers and the plant is zero-discharge for waste water.

Plant Location Description: Jim Bridger Plant is located in Deadman Wash. Coal is received by conveyor from a dedicated coal mine, and supplemental coal is received by truck from nearby mines and by rail from other Wyoming coal mines. The plant is located in an air attainment area, however exceedances of the ambient particulate standard have occurred in Deadman Wash due to coal handling activities at the power plant and coal mines. Unit 4 must comply with Subpart D of the New Source Performance Standards (NSPS).

Naughton Plant

Maximum Nameplate Rating: 707 MW

Location: Lincoln County, Wyoming, 5 miles south of Kemmerer.

Fuel: Sub-bituminous coal, 9800 BTU/lb, 5% ash, 0.7% sulfur (1.4 lb SO2/MMBTU).

Plant Description: Three units; commercial operation in 1963, 1968, and 1971. Each unit has a tangentially-fired boiler and electrostatic precipitator for particulate control. Unit 3 has a wet sodium FGD system operating at 0.5 lb SO2/MMBTU. Each unit has mechanical draft cooling towers. Water is discharged under an NPDES permit to Hams Fork River.

Plant Location Description: Naughton Plant is located in a valley, coal is received by conveyor from a dedicated coal mine. The plant is located in an air attainment area, however Units 1 and 2 are under a compliance schedule to reduce SO2 emissions through coal blending and natural gas co-firing.

Wyodak Plant

Maximum Nameplate Rating: 362 MW

Location: Campbell County, Wyoming, 4 miles east of Gillette.

Fuel: Sub-bituminous coal, 7900 BTU/lb, 8% ash, 0.68% sulfur (1.7 lb SO2/MMBTU)

Plant Description: One unit; commercial operation in 1978. The unit has a wall-fired boiler, electrostatic precipitator

for particulate control, and a dry lime spray dryer FGD system operating at 0.5 lb SO2/MMBTU. The unit has an air cooled condenser and no waste water is discharged from the plant.

Plant Location Description: Wyodak Plant is located in a valley near I-90. A small coal plant is operated adjacent to Wyodak by Black Hills Power & Light; coal is received by conveyor from a dedicated coal mine. The plant is located in an air attainment area.

Thermal Plants Owned But Not Operated by PacifiCorp

Cholla 4

PacifiCorp owns Unit 4 of the four unit Cholla Plant

Maximum Nameplate Rating: 414 MW

Location: Near Joseph City in Navajo County, Arizona.

Fuel: Sub-bituminous coal, 9840 BTU/lb, 13.9% ash, 0.46% sulfur (0.9 lb SO2/MMBTU).

Plant Description: Began commercial operation in 1978. The unit has a tangentially-fired boiler, electrostatic precipitator for particulate control, and a wet limestone FGD system operating at 0.8 lb SO2/MMBTU. The unit has mechanical cooling towers and no waste water is discharged from the unit.

Plant Location Description: The plant is located near I-40; coal is shipped from New Mexico. The plant is located in an air attainment area.

Colstrip Plant

PacifiCorp owns 10% of Units 3 and 4 of the four-unit Colstrip Plant.

Maximum Nameplate Rating: 1729 MW (100% of Units 3 and 4).

Location: Near Colstrip, in Rosebud County, Colorado.

Fuel: Sub-bituminous coal, 8600 BTU/lb, 9.4% ash, 0.65% sulfur (1.5 lb SO2/MMBTU)

Plant Description: Units 3 and 4 began commercial operation in 1984 and 1986. The units have tangentially-fired boilers and wet venturi lime scrubbers for particulate control, and FGD systems operating at 0.1 lb SO2/MMBTU. The units have mechanical cooling towers and no waste water is discharged from the plant.

Plant Location Description: The plant is located near a coal mine.

Craig Plant

PacifiCorp owns 19.3% of Units 1 and 2 of the three-unit Craig Plant.

Maximum Nameplate Rating: 892 MW (100% of Units 1 and 2).

Location: Near Craig, in Moffat County, Colorado.

Fuel: Sub-bituminous coal, 10040 BTU/lb, 6.8% ash, 0.38% sulfur (0.75 lb SO2/MMBTU).

Plant Description: Units 1 and 2 began commercial operation in 1980. The units have wall-fired boilers with low-NOx burners, electrostatic precipitators for particulate control, and wet limestone FGD systems operating at 0.4 lb SO2/MMBTU. The units have mechanical cooling towers and no waste water is discharged from the plant.

Plant Location Description: The plant is located in the Yampa River valley; coal is received from a nearby mine. The plant is located in an attainment area.

Hayden Plant

PacifiCorp owns 17.5% of Units 1 and 2 of the three-unit Craig Plant.

Maximum Nameplate Rating: 365 MW (100% of

Units 1 and 2).

Location: Near Hayden, in Routt County, Colorado.

Fuel: Sub-bituminous coal, 10700 BTU/lb, 9.9% ash, 0.44% sulfur (0.8 lb SO2/MMBTU).

Plant Description: Units 1 and 2 began commercial operation in 1965 and 1976. Unit 1 has a wall-fired boiler and electrostatic precipitators for particulate control. Unit 2 has a tangentially-fired boiler and an electrostatic precipitator. The units have mechanical cooling towers.

Plant Location Description: The plant is located in the Yampa River valley; coal is received from a nearby mine. The plant is located in an attainment area.

Figure E-1:

Principal Power Facilities, Western United States(1)

Table A-1: Federal System Hydroelectric Projects

September 30, 1992

Project	Initial Year of Service	Number of Units	Name-plate Rating (MW)	Instantaneous Generating Capacity(2) (peak MW)	Firm Energy (aMW)
U.S. Bureau of Reclamation Hydroelectric Projects					
Grand Coulee	1941	30	6,450.0	6,684	1,865
Hungry Horse	1952	4	392.0	428	107
Palisades	1957	4	142.2	164	61
Anderson Ranch	1950	2	27.0	30	11
Minidoka	1909	7	13.4	16	9
Roza	1958	1	11.3	13	4
Black Canyon	1925	2	8.0	10	7
Chandler	1956	2	12.0	13	7
Total Bureau of Reclamation Projects		**52**	**7,055.9**	**7,358**	**2,071**
U.S. Army Corps of Engineers Hydroelectric Projects					

Chief Joseph	1955	27	2,069.0	2,614	1,114
John Day	1968	16	2,160.0	2,484	872
The Dalles	1957	22	1,780.0	2,074	697
Bonneville	1938	18	1,050.0	1,186	537
McNary	1953	14	980.0	1,127	630
Lower Granite	1975	6	810.0	932	188
Lower Monumental	1969	6	810.0	930	191
Little Goose	1970	6	810.0	932	185
Ice Harbor	1961	6	603.0	693	187
Libby	1975	5	525.0	600	197
Dworshak	1974	3	400.0	460	144
Lookout Point	1954	3	120.0	138	24
Detroit	1953	2	100.0	115	34
Green Peter	1967	2	80.0	92	22
Lost Creek	1975	2	49.0	56	23
Albeni Falls	1955	3	42.6	49	26
Hills Creek	1962	2	30.0	35	14
Cougar	1964	2	25.0	29	12
Foster	1968	2	20.0	23	10
Big Cliff	1954	1	18.0	21	11
Dexter	1955	1	15.0	17	8

Total Corps of Engineers Projects		**149**	**12,496.6**	**14,607**	**5,126**
Total Bureau of Reclamation and Corps of Engineers Projects		**201**	**19,552.5**	**21,965**	**7,197**

SOURCE: Bonneville Power Adminstration, Pacific Northwest Loads and Resources Study, December 1992

Table A-2: Non-Federally Owned BPA Resources and Contracts

Project	**Type**	**Operator**	**Date in Service**	**OY 1993-94 Capacity (peak MW)**	**OY 1993-94 Firm Energy (aMW)**
Existing Non-Federally Owned BPA Resources					
Trojan (30%)	Nuclear	PGE	1976	331	214
WNP-2	Nuclear	WPPSS	1984	1,100(3)	7051
Boardman	Coal	PGE	1992(4)	50	29
Packwood Lake	Hydro	WPPSS	1964	30	6
Idaho Falls	Hydro	City of Idaho Falls	1982	18	18

Cowlitz Falls	Hydro	Lewis County PUD	1994	0(5)	103

Total Non-Federally Owned BPA Resources				**1,529**	**982**

Firm Contracts					

Canadian Entitlement				186	62
Restoration, Columbia River Treaty w/Canada				0	-26
Southwest Capacity/Energy Exchange				0	9
Montana Power Capacity/Energy Exchange				0	29
PP&L (Wyoming) Import for Southern Idaho Load				189	94
Basin Electric Cooperative Purchase				120	105
Powerex (TransAlta) Purchase				125	100
WNP-3 Exchange Settlement Agreements				0	113
Total BPA Firm Contracted Resources				**620**	**486**

SOURCE: Bonneville Power Adminstration, Pacific Northwest Loads and Resources Study, December 1992

Table A-3 summarizes the Federal system firm energy resources and contracts available to meet Federal firm loads for OY 1993-94. Federal system firm energy resources are comprised as follows: 83 percent from hydroelectric power, 11 percent from two nuclear power plants, 6 percent from BPA's firm contracts, and less than 1 percent from BPA's share of the Boardman coal-fired facility.

Table A-1: Federal System(6) Firm Resources for OY 1993-94(7)

Project Type	Generating Peak Capacity (MW)	Generating Peaking Capacity % of Total	Firm Energy (aMW)	Firm Energy % of Total
Hydro	21,440	91	7,233	83
Nuclear	1,431	6	920	11
Coal	50	0	28	0
Firm Contracts	620	3	487	6
Total Federal Resources	**23,541**	**100**	**8,668**	**100**

Table A-1: Federal System(8) Firm Resources for OY 1993-94(9)

Project Type	Generating Peak Capacity (MW)	Generating Peaking Capacity % of Total	Firm Energy (aMW)	Firm Energy % of Total
Hydro	21,440	91	7,233	83
Nuclear	1,431	6	920	11
Coal	50	0	28	0
Firm	620	3	487	6

Contracts				
Total Federal Resources	**23,541**	**100**	**8,668**	**100**

(1) Adapted from Western Area Power Administration, 1992, Principal Power Facilities of the Western United States (map).

(2)Maximum generation under optimum conditions. Does not reflect reduction to the peaking capacity of the hydro system due to the drafting of reservoirs and other project constraints.

(3)Efficiency improvements will increase WNP-2 maximum capacity to 1,155 megawatts and maximum capability to 751 average megawatts when completed in OY 1996. WNP-2 expected energy output prior to the efficiency improvements was 715 aMW; however, in OY 1993-94, an extended maintenance schedule reduced WNP-2 generation to 705 aMW.

(4)Seasonally acquired by BPA from PNGC for September through April, OY 1992-93 through 1994-95.

(5)Acquired by BPA on January 28, 1991 and will become operational April 1, 1994. Full energy capability is 22 average megawatts and maximum capacity is 70 megawatts starting OY 1994-95.

(6)Includes Federally and non-Federally owned projects

(7)Operating Year (OY) is the 12-month period August 1 through July 31. For example, OY 1993-94 is August 1, 1993 through July 31, 1994.

(8)Includes Federally and non-Federally owned projects

(9)Operating Year (OY) is the 12-month period August 1 through July 31. For example, OY 1993-94 is August 1, 1993 through July 31, 1994.