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WESTERN AREA POWER ADMINISTRATION CUSTOMER DATABASE

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SUMMARY

This report describes a comprehensive customer database compiled by the Pacific Northwest Laboratory (PNL) to assist with analyses conducted as part of the Western Area Power Administration Energy Planning and Management Program Environmental Impact Statement (EIS). The database was used by PNL as a tool to help select a sample of Western customers for potential participation in the Organizational Impacts Analysis case studies, and was used as part of the Utility Impact Analysis to identify sources and costs of auxiliary power. Secondary information sources were used predominantly to compile one year of system related information on the Western customers (over 600) included in the database. This information was useful for its intended purposes; however, year-to-year information may not be consistent across utilities and not all information was available for each utility.

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1.0 INTRODUCTION

A comprehensive customer database was compiled by Pacific Northwest Laboratory (PNL) as part of the Organizational Impacts Analysis task of the Western Area Power Administration (Western) Energy Planning and Management Program Environmental Impact Statement (EIS). The database was developed from secondary sources of information and includes over 600 Western customers.

Western markets and transmits federally produced power to customers in 15 states in the western United States. Its wholesale power customers include cooperatives, municipalities, public utility districts, Federal and state agencies, irrigation districts, Bureau of Reclamation projects and facilities, and certain investor-owned utilities. This wholesale power network, in turn, provides service to millions of retail customers.

The database was compiled to respond to PNL's need for a central source of information on Western customers. It was used by PNL to characterize Western customers in terms of type, load characteristics, and use of Federal power. This characterization allowed PNL to select a fairly representative group of Western customers from each Western area for potential participation in the Organizational Impacts Analysis data collection meetings which took place in the fall of 1991.

This report describes the database and its structure, data fields, data sources and quality assurance. The vast majority of data used in the database was not obtained directly from Western customers, but was obtained from Western reports, industry listings, and other secondary sources. The only customers asked to verify or provide additional information on their system were those customers (approximately five percent) who participated in the Organizational Impacts Analysis data collection meetings. PNL used 1991 data when possible, however 1991 data were not consistently available for all data categories; therefore, data from 1989 and 1990 were sometimes used.

Because the database does not contain data for one particular year, and because primary data were not used, PNL recommends that the database user interpret any analysis based on this information with caution. The database does, however, offer the user a consolidated, central source of information on the majority of Western customers. It may be particularly useful as a starting point or framework for future Western database development efforts.

2.0 DATABASE STRUCTURE

Due to the unique characteristics of Western's five geographic service areas, and the overly cumbersome size that a single database would represent, five separate databases were developed: one for each area office. Five relatively small databases allowed for simultaneous data entry and better overall quality assurance. The database files were created using PARADOX, a common database software program which can be run on IBM-compatible personal computers. The file names given to the databases correspond to the five Western area offices and are as follows:

<u>Database</u>	<u>Area Office</u>
BAO.DB	Billings, Montana
LAO.DB	Loveland, Colorado
SAO.DB	Sacramento, California
SLAO.DB	Salt Lake City, Utah
PAO.DB	Phoenix, Arizona

2.1 DATA FIELDS

Table 2.1 contains a brief description of each database field, and Appendix A contains the database fields included for each area office. The database fields are the same across Western area offices except for the Federal hydropower project fields, which refer to specific Federal hydropower projects. Federal hydropower availability varies according to geographic region and, therefore, by Western area office. Hydropower projects included in the database are listed in Table 2.2.

TABLE 2.1. Western Area Power Customer Database - Primary Fields

Data Field	Description
ID #	Unique identification number for easy reference
State	The state where the customer is located
Customer Name	The name of the customer
Customer Type	Customers are classified according to the following customer types; MUNI (municipality), REC (rural electric cooperative), PUD (public utility district), FED (Federal), STATE (state), ID (irrigation district), and IOU (investor-owned utility)
Member of	Lists the name of the parent organization, such as a joint action agency or member-based cooperative, that the customer is a member of
System Peak (kW)	The system peak (in kilowatts)
System energy (MWh)	Annual system-wide energy sales (in megawatt hours)
Seas peak (kW) summer	The system peak (in kilowatts) for summer months
Seas peak (kW) winter	The system peak (in kilowatts) for winter months
Percent Western	The percent of the customer's total sales that are met through resources acquired from Western
Project allocation (MWh) summer	The customer's Western allocation for summer months (in megawatt hours) by Western project ^(a)
Project allocation (MWh) winter	The customer's Western allocation for winter months (in megawatt hours) by Western project ^(a)
Proj capacity (MW) summer	The customer's Western project capacity for summer months (in megawatts) by Western project ^(a)
Proj capacity (MW) winter	The customer's Western project capacity for the winter months in megawatts by Western project ^(a)
Proj energy (MWh)	The customer's Western energy in megawatt hours by Western project ^(a)
Residential sales (MWh)	The customer's annual energy sales in megawatt hours to residential consumers
Commercial sales (MWh)	The customer's annual energy sales in megawatt hours to commercial consumers

Data Field	Description
Industrial sales (MWh)	The customer's annual energy sales in megawatt hours to industrial consumers
# customers: residential	The number of residential accounts served by the customer
# customers: commercial	The number of commercial accounts served by the customer
# customers: industrial	The number of industrial accounts served by the customer
Avg. retail rate: (cents/kWh):res	The average retail rate (in dollars) charged to the customer's residential sector users
Avg. retail rate: (cents/kWh):com	The average retail rate (in dollars) charged to the customer's commercial sector users
Avg. retail rate: (cents/kWh):ind	The average retail rate (in dollars) charged to the customer's industrial sector users
Aux cost (cents/kwh)	The likely cost of the customer's next available power source (in cents per kilowatt hour)
(a) Some Western customers receive Western allocations for more than one project.	

TABLE 2.2. Western Area Power Hydropower Projects Included in the Database

Area office	Database Acronym	Western Area Power Hydropower Project
Billings Area Office (BAO)	Ped	Pick-Sloan Missouri Basin Project
Loveland Area Office (LAO)	Slip Lap	Salt Lake City Area Integrated Projects Loveland Area Projects
Sacramento Area Office (SAO)	Cvp	Central Valley Project
Salt Lake Area Office (SLAO)	Slip	Salt Lake City Area Integrated Projects
Phoenix Area Office (PAO)	Pdp Slip Bcp Cap	Parker Davis Project Salt Lake City Area Integrated Projects Boulder Canyon Project Central Arizona Project

2.2 DATA SOURCES

PNL relied on Western headquarters and the Western area offices to identify information sources. Data collection visits were held at headquarters and the area offices in October and November 1991 to explain PNL's specific data needs, collect data, and learn more about the unique circumstances faced by each Western area office and its customers.

When possible, PNL used data sources developed by Western. Other sources included the 1992 Directory of Electric Utilities (Electrical World 1991) and an unpublished report on the conservation and renewable energy (C&RE) requirements of Western customers prepared for Western by NEOS Corporation in 1990. For a list of the data sources used for each data field entry by Western area office, see Appendix A.

Because of the broad range of information required for the database it was decided to use data sources from different years. The most current sources available were always used. Some data sources contained data that could be used across Western area offices, while others, especially those obtained from the area offices, were specific to one area office or its Federal hydropower project.

The 1990 Western Annual Report Statistical Appendix (Western 1990) was used to develop the initial list of Western customers and provided much of the data for Western customers' Federal project allocation, capacity, and energy use. Customer-specific hydropower project use information was often obtained from the customer's area office. Because the annual report did not contain some of Western's ultimate consumers (i.e., Western customers who receive their allocation from other Western customers), we pulled information from another source - Western's 1991 memo to its area offices discussing Western's customers' sales to ultimate consumers in 1989. This internal report was also used as the primary information source for the number, average rate, and megawatt hours of energy use by residential, commercial, and industrial customers, as well as the customer's likely auxiliary power source and cost.

3.0 DATA ENTRY QUALITY ASSURANCE

In order to maintain the quality and integrity of the customer database, a quality assurance (QA) process was established by PNL. In light of the size and complexity of the database, this QA process was viewed as critical by the PNL project team.

The following QA procedures were established to protect the quality and integrity of the Western customer database:

- Master File Storage - Master copies of all Western database files were stored on the hard drive of a central computer. The files were backed up once per week (more often if substantial data entry had been completed).
- File Use Procedure - Use of any Western files for data entry, quality assurance, or other purposes required the user to fill out a Western Database Status Report. This report requires the user to indicate the file(s) in use and the date they will be returned.
- Data Source Library - A separate file for each area office containing the data source used for each data entry was updated regularly.
- Quality Assurance Documentation Form - Each time one of the QA checks described below was completed on the database, a Quality Assurance Documentation Form was required to be filled out. For an example of this form, see Appendix B. Completed forms are stored in the Western project files at PNL.
- Parameter Quality Check - A set of parameters was developed by PNL for each customer data category to check for data "outliers." These parameters set a low and high end for each data category. A quality check using these parameters was conducted via a computer program when the database was 50% and 100% complete.
- Ratio Quality Check - A set of ratios was developed by PNL to check for customer data that might be suspect based on its relationship to another customer's characteristics. For example, the ratio of residential sales to total energy sales for a particular customer, if vastly different from other customers of the same type, might indicate erroneous data or a data entry error. A quality check using these parameters was conducted via a computer program when the database was 50% and 100% complete.

- Combined Quality Check - Western customers were entered into individual databases according to area office. Because these area offices sometimes cross state boundaries, and because some customers may be listed as customers of more than one area office or member-based association, it was important to run a consolidated check of all customers across area offices. This quality check was run after the database was 50% and 100% complete.

4.0 CONCLUSIONS

The Western Area Power Customer Database compiled by PNL is a central source of information that can be used to characterize Western customers. Although the data used to compile the database were obtained from secondary sources and contains data from the years 1989 to 1991, the database offers the user a consolidated source of information on Western customers.

5.0 REFERENCES

Electrical World. 1991. Directory of Electric Utilities, 100th edition, McGraw-Hill Inc., New York.

Western Area Power Administration. 1990. Statistical Appendix to the 1990 Annual Report, Western Area Power Administration, Golden, Colorado.

APPENDIX A

WESTERN CUSTOMER DATA FIELDS AND DATA SOURCES BY AREA

APPENDIX A

WESTERN CUSTOMER DATA FIELDS AND DATA SOURCES BY AREA

Several sources were used to obtain the information entered into the customer database. Whenever possible information was obtained directly from the Western Area Power Administration or its area offices. Tables A.1 through A.5 list the sources from which the data was obtained for each database field for the five area offices. The primary source is the source from which the data was obtained; if a second source was also used for a particular field, that source is indicated in the secondary source column on the tables below. The sources are listed in Table A.6.

TABLE A.1. Billings Area Office Customer Database Sources

Database Field Name	Primary Source	Secondary Source
ID Number		
State	1	
Customer Name	1	2
Type of Customer	1	2
Member of	2	
System Peak (kW)	3	
System Energy (MWh)	3	
Seasonal Peak (kW), summer	3	
Seasonal Peak (kW), winter	3	
Percent Western (percent of total sales)	4	
Ped Project Allocation (MWh), summer	1	
Ped Project Allocation (MWh), winter	1	
Ped Project Capacity (kW), summer	1	
Ped Project Capacity (kW), winter	1	
Ped Project energy (MWh)	1	
Residential Sales (MWh)	2	

Commercial Sales (MWh)	2	
Industrial Sales (MWh)	2	
Number of Customers - residential	2	
Number of Customers - commercial	2	
Number of Customers - industrial	2	
Average Retail Rate (cents/kWh) - residential	2	
Average Retail Rate (cents/kWh) - commercial	2	
Average Retail Rate (cents/kWh) - industrial	2	
Auxiliary Power Source	2	
Auxiliary Cost (cents/kWh)	2	

TABLE A.2. Loveland Area Office Customer Database Sources

Database Field Name	Primary Source	Secondary Source
ID Number		
State	1	
Customer Name	1	2
Type of Customer	1	2
Member of	2	2
System Peak (kW)	3	
System Energy (MWh)	3	
Seasonal Peak (kW), summer	3	
Seasonal Peak (kW), winter	3	
Percent Western (percent of total sales)	4	
Lap Project Allocation (MWh), summer	8	
Lap Project Allocation (MWh), winter	8	
Slip Project Allocation (MWh), summer	8	6
Slip Project Allocation (MWh), winter	8	6
Lap Project Capacity (kW), summer	8	1
Lap Project Capacity (kW), winter	8	1
Slip Project Capacity (kW), summer	8	6
Slip Project Capacity (kW), winter	8	6
Lap Project Energy (MWh)	8	1
Slip Project Energy (MWh)	8	6
Residential Sales (MWh)	2	
Commercial Sales (MWh)	2	
Industrial Sales (MWh)	2	
Number of Customers - residential	2	
Number of Customers - commercial	2	
Number of Customers - industrial	2	
Average Retail Rate (cents/kWh) - residential	2	
Average Retail Rate (cents/kWh) - commercial	2	
Average Retail Rate (cents/kWh) - industrial	2	
Auxiliary Power Source	2	
Auxiliary Cost (cents/kWh)	2	

TABLE A.3. Sacramento Area Office Customer Database Sources

Database Field Name	Primary Source	Secondary Source
ID Number		
State	1	
Customer Name	1	2
Type of Customer	1	2
Member of	2	
System Peak (kW)	3	
System Energy (MWh)	3	
Seasonal Peak (kW), summer	3	
Seasonal Peak (kW), winter	3	
Percent Western (percent of total sales)	5	4
CVP Project Allocation (MWh), summer	1	
CVP Project Allocation (MWh), winter	1	
CVP Project Capacity (kW), summer	1	
CVP Project Capacity (kW), winter	1	
CVP Project Energy (MWh)	1	
Residential Sales (MWh)	2	
Commercial Sales (MWh)	2	
Industrial Sales (MWh)	2	
Number of Customers - residential	2	
Number of Customers - commercial	2	
Number of Customers - industrial	2	
Average Retail Rate (cents/kWh) - residential	2	
Average Retail Rate (cents/kWh) - commercial	2	
Average Retail Rate (cents/kWh) - industrial	2	
Auxiliary Power Source	2	
Auxiliary Cost (cents/kWh)	2	

TABLE A.4. Salt Lake City Area Office Customer Database Sources

Database Field Name	Primary Source	Secondary Source
ID Number		
State	1	
Customer Name	1	2
Type of Customer	1	2
Member of	2	
System Peak (kW)	3	
System Energy (MWh)	3	
Seasonal Peak (kW), summer	3	
Seasonal Peak (kW), winter	3	
Percent Western (percent of total sales)	4	
Slip Project Allocation (MWh), summer	6	
Slip Project Allocation (MWh), winter	6	
Slip Project Capacity (kW), summer	1	
Slip Project Capacity (kW), winter	1	
Slip Project Energy (MWh)	6	1
Residential Sales (MWh)	2	
Commercial Sales (MWh)	2	
Industrial Sales (MWh)	2	
Number of Customers - residential	2	
Number of Customers - commercial	2	
Number of Customers - industrial	2	
Average Retail Rate (cents/kWh) - residential	2	
Average Retail Rate (cents/kWh) - commercial	2	
Average Retail Rate (cents/kWh) - industrial	2	
Auxiliary Power Source	2	
Auxiliary Cost (cents/kWh)	2	

TABLE A.5. Phoenix Area Office Customer Database Sources

Database Field Name	Primary Source	Secondary Source
ID Number		
State	1	
Customer Name	1	2
Type of Customer	1	2
Member of	2	
System Peak (kW)	3	
System Energy (MWh)	3	
Seasonal Peak (kW), summer	3	
Seasonal Peak (kW), winter	3	
Percent Western (percent of total sales)	4	
Pdp Project Allocation (MWh), summer	7	1
Pdp Project Allocation (MWh), winter	7	1
Slip Project Allocation (MWh), summer	7	1
Slip Project Allocation (MWh), winter	7	1
Bcp Project Allocation (MWh), summer	7	1
Bcp Project Allocation (MWh), winter	7	1
Cap Project Allocation (MWh), summer	7	1
Cap Project Allocation (MWh), winter	7	1
Pdp Project Capacity (kW), summer	7	1
Pdp Project Capacity (kW), winter	7	1
Slip Project Capacity (kW), summer	7	1
Slip Project Capacity (kW), winter	7	1
Bcp Project Capacity (kW), summer	7	1
Bcp Project Capacity (kW), winter	7	1
Cap Project Capacity (kW), summer	7	1
Cap Project Capacity (kW), winter	7	1
Pdp Project Energy (MWh)	7	1
Slip Project Energy (MWh)	7	1
Bcp Project Energy (MWh)	7	1
Cap Project Energy (MWh)	7	1

Database Field Name	Primary Source	Secondary Source
Residential Sales (MWh)	2	
Commercial Sales (MWh)	2	
Industrial Sales (MWh)	2	
Number of Customers - residential	2	
Number of Customers - commercial	2	
Number of Customers - industrial	2	
Average Retail Rate (cents/kWh) - residential	2	
Average Retail Rate (cents/kWh) - commercial	2	
Average Retail Rate (cents/kWh) - industrial	2	
Auxiliary Power Source	2	
Auxiliary Cost (cents/kWh)	2	

TABLE A.6. Sources

1	Western Area Power Administration. 1990. <u>Statistical Appendix to the 1990 Annual Report</u> , Western Area Power Administration, Golden, Colorado.
2	This information was derived from 1989 data compiled by Western on Western's customers' sales to their ultimate consumers.
3	Electrical World. 1991. <u>Directory of Electric Utilities</u> , 100th edition, McGraw-Hill Inc., New York.
4	This information was taken from 1983 to 1990 data prepared for Western's Conservation and Renewable Energy Program by NEOS Corporation in 1990.
5	This is a derived field (from other database fields).
6	The Slip customer FY 1991 statistics information was provided by the Salt Lake Area Office.
7	The yearly and monthly report of energy deliveries for fiscal year 1991 was provided by Western headquarters.
8	Information on 1990 customer contracts was provided by the Loveland Area Office.

APPENDIX B

QUALITY ASSURANCE DOCUMENTATION FORM FOR
WESTERN AREA POWER CUSTOMER DATABASE

APPENDIX B

QUALITY ASSURANCE DOCUMENTATION FORM FOR WESTERN AREA POWER CUSTOMER DATABASE

All quality assurance activities completed on Western databases should be documented on this form. The Western Customer Database Quality Assurance Procedures Report located in the project files describes the kinds of quality checks that should be conducted at regular intervals.

Date: _____

Completed By: _____

Area Office(s): _____

Activity Type:

Activity Description:

Problems Encountered:

Actions Taken:

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