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END-USE LOAD AND CONSUMER ASSESSMENT PROGRAM: UTILITY BILLING RECORDS PROJECT: HISTORY, PROCEDURE, AND SUMMARY

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CONTENTS

1.0 PROJECT PURPOSE AND SCOPE

The utility billing records project was originally included as part of a regional utility information program. This program was initiated to create a central data bank of regional utility information. As a part of this program utility billing information was to be collected for the various utilities and their customers throughout the Bonneville Power Administration (BPA) region.

The initial scope of the billing records project included the gathering and database input of electric utility bills, and rate structures for the many participants in the early Pacific Northwest Residential Energy Survey (PNWRES) and subsequent End-use Load and Consumer Assessment Program (ELCAP). Eventually the scope was widened to include records for gas and oil use. Later in the project the billing records for the residences in the Hood River Conservation Study were also added to the database. Individual electric, gas, and oil bills for the various participants were to be acquired and entered in a database structure for a period of time beginning in 1983 (the Hood River electric data was already collected and had a began date in 1981) and continuing through the most current data available at the time. Corresponding utility rate structures were also to be collected and entered for the same time period. This data could be used in direct comparison with existing and future end-use metered data from ELCAP or other metering studies that may develop. It would also become a unique database representing retail energy usage and cost for a variety of customers across many different utilities throughout the Northwest.

2.0 SUMMARY OF LESSONS LEARNED

The utility billing records project involved massive efforts in collecting, organizing, transferring and referencing detailed data. As with any similar type of activity there are always opportunities for improvement of the system. In addition there are specific characteristics of utility billing systems and record keeping that effect data gathering efforts. Several specific items were identified during this effort that may be useful or of interest in other billing record efforts of this kind. Some of these could apply to many types of data gathering activities while others are specific to billing records.

• PRE-REQUEST UTILITY CONTACT. Contact was made with virtually all of the utilities with possible records before request letters were sent out. This was helpful in identifying the individual with the authority to act on the request and preparing them for the actual request. In virtually all cases the primary contact for access to both residential and commercial records was the same individual or office. It is also a good opportunity to discuss the use of electronic copies of the data (for large numbers) and access to older data. If periodic requests for data are anticipated in the future, this could also be addressed.

• UTILITY INFORMATION ON WAIVER. Energy information waivers should be designed to include electric and gas utility and/or other fuel supplier identification as well as associated account numbers. An entire effort involving the matching of zip codes to utility areas could have been avoided in this project if all of the waivers used contained this information. The account numbers are extremely useful to each utility in accessing the correct information. This is particularly true with commercial accounts as they may have multiple services. There were no cases known to us of the loss of data due strictly to the lack of account number information. However, a lack of these numbers is sure to cause delays in acquiring the records.

• CONTINUITY OF WAIVER COVERAGE. If continuous streams of data are important, it is necessary to assure that the waivers used to access the data cover a continuous time period. It is not always sufficient to simply denote a large window of time on the waiver. Utilities are usually restricted to release of data only for the customer identified on the waiver and usually for a specific building or location. If the location of interest had more than one occupant (customer) during the needed time period then multiple waivers may be needed. For historical data this may be an arduous task.

• ACCESSIBILITY OF RECORDS BY UTILITY. Many different forms of utility accounting systems exist and some utilities have only had electronic data storage systems for a short time. In most cases a utility will have ready "on-line" access to between 12 and 24 months of data (usually 12 to 18). This data is usually very easily supplied by the utility. Older data would need to be brought out of storage in some form or another. In some cases this can be difficult if; 1) there has been a change in computer formats, 2) the data was not stored electronically to save cost or due to lack of system capability, 3) the computer system was not in operation at that time. In some cases this "archived" data can be very time consuming to decode. Approximately half of the utilities that responded with data records from before 1985 had to send them in some form other than their current (usually) computer printout format. Because of this it may be wise to attempt to request data early and in some periodic format to assure easy access by the utility.

• ELECTRONIC VS. PAPER RECORDS. It is generally (but not always) preferable to receive data in an electronic format. This can help eliminate errors associated with manual data input and can be much faster. The experience with this project was that without any direct persuasion a utility would most likely send paper printouts of data unless extremely large numbers were involved. With some effort many may be convinced that electronic data would be just as easy. There will be cases where electronic versions may be more time consuming than paper records. A large number of different utility accounting formats (databases, spreadsheets, etc.) could amount to massive programming to extract the data. However, if periodic requests are anticipated then creating the extraction program for future multiple requests may be the best option even for smaller utilities. For single requests or anticipated very small numbers of records it might be most efficient if the data was sent on paper. Although the number may vary depending on programming format, it is thought that a one time set or total collection of up to 300 records might be most efficiently input manually.

3.0 PROJECT CHRONOLOGY

This chronology is included to provide an idea of the timeframe and relative order of each of the various tasks throughout the project. Additional detail concerning specific activities, implementation, outcome, etc. can be found in sections 4.0, 5.0, 6.0, 7.0, and the Appendices that follow.

EARLY 1986

Work has begun on creating a Utility Information Network (UIN). This network was initiated to serve as a center for Pacific Northwest electric utility information. It would also create a cooperative channel for information exchange between utilities and other energy related organizations. A primary method of arranging this information channel was a "Memorandum Of Understanding" (MOU). This document was a basic outline and agreement of the kind of information exchange that could be expected between the utilities and various other organizations.

At this same time the vast utility customer contacts being made by PNWRES and ELCAP were sought as a base for accumulating individual customer billing records. Each PNWRES and ELCAP residential participant to date (additional ELCAP participants are still being recruited) has signed an "information waiver" (see Appendix B) of one form or another that allows access to their utility billing records for study purposes. These waivers are made available, but are not categorized in any fashion to indicate their corresponding utility. Since information concerning each participant's servicing utility was not always available on the waiver, a sorting process was initiated to determine this for each site. Each participants Zip Code was used to initially identify the utility servicing their area. While this sorting did match the vast majority correctly, the overlapping of utility service areas created many mismatches that were eventually sorted out during the course of the project.

MID 1986

Several utilities have signed MOU's (see above). Some appear hesitant or have requested changes in wording and scope of the document. At this point it is decided to proceed with the billing requests separately. As a part of

the UIN process a listing of utilities in the Northwest has been compiled that includes contact names and addresses. A large number of these utilities have been contacted by phone to get some verbal indication of cooperation.

A letter is prepared detailing the kind of information that is being requested. It is sent to all utilities for which we have signed information waivers from their customers. These letters include waivers for residential customers only and go out in July and August of 1986. At this time copies of the ELCAP commercial participant waivers are being gathered from the ELCAP recruitment files. Since the commercial site recruiting process is still underway, not all of them are immediately available.

EARLY 1987

The ELCAP commercial participant waivers are sorted and letters go out to the corresponding utilities. In most cases these same utilities were already contacted with residential waivers.

Billing records have been coming in since late 1986. A format within the existing ELCAP Characteristics Data Base (CDB) is created to contain the billing data. It is carefully constructed to include virtually any different billing format. Similarly a format is constructed for the various utility rates that will be included. It is prepared to accommodate not only residential and commercial but industrial, street lighting, and other miscellaneous rate forms. As soon as the billing and rate formats are finalized, data encoding begins.

BPA requests that in addition to the electric billing we also collect fossil fuel information for any gas or oil heated buildings. A database search on installed building heating equipment is done to determine gas and oil users in the ELCAP residential and commercial samples.

MID 1987

A sort of the waivers for oil and gas users is completed to identify corresponding utilities. Phone contact was made with those residences using oil to determine their oil supplier. Letters are prepared and sent in August and September of 1987 to the gas and oil suppliers identified.

EARLY 1988

BPA requests that we attempt to get additional (current) months of data for the same customers as before. This data would be particularly useful as coincident data to the vast amount of current ELCAP metered data that is continuing to accumulate.

Since the entire process will be repeated, an extensive database search of metered ELCAP participants is completed and corresponding waivers acquired to assure that we will be requesting data for all ELCAP metered sites. Also collected are waivers for some new participants not yet in ELCAP databases and new occupants of some original participant residences. All waivers uncovered in this process will be included in this latest data gathering effort.

MID 1988

Letters for this additional data request go out to all appropriate utilities in May 1988. In order to encourage any utilities that are hesitant or slow in responding, a reminder letter is sent out in August of 1988. A few utilities indicate that they will not be able to respond at that time but may be able to in the future. It is decided that the end of the 1988 calendar year will be the cutoff for loading data to the database. Any data received after that time will have to be dealt with under a different project.

Data encoding is caught up with the arriving data. In order to assure accuracy of the database, a quality assurance check is begun for all records. For records received on paper copy (the majority), each set of database inputs is printed and manually checked with the original utility records. This is done for both billing and rate records.

During 1988 the previously collected Hood River Study actual billing records are added to the existing database (the records were collected by another source).

DECEMBER 1988

All billing and rate records received to date are checked and entered in the database.

MID 1990

As a part of a records transfer activity all paper copy (includes majority of PNWRES and ELCAP) original billing and rate records are sent to BPA. Also sent is some information on the MOU process and some quality assurance check printouts.

4.0 BILLING DATA REQUESTS

4.1 INFORMATION WAIVERS

As a part of both PNWRES and ELCAP each residence or building owner signed a participant agreement that included permission for access to utility information data.

For PNWRES an "Authorization Form For Utility Consumption Information" was used (see Appendix B). It provided access to all electric and/or gas consumption records as well as any other building audit and conservation program participation data.

The ELCAP project utilized a "Cooperative Agreement (ELCAP)" (see Appendix B) which came in different formats depending on the type of metering installation to be completed at the site. It was prepared and used in both commercial and residential forms. It's primary purpose was to allow for installation of metering equipment, collection of end-use data, and completion of building energy audits. It also included provisions for access to energy consumption data from all suppliers for the time the agreement was in effect.

Each of these waiver formats was used throughout the utility billing project. Neither was ever questioned by any energy supplier. The fact that the PNWRES waiver only included gas and electric suppliers was a potential problem in terms of oil data. Fortunately all of the identified oil heated buildings were a part of ELCAP and were covered under the ELCAP waiver.

In general the PNWRES waiver included the kind of information needed when requesting utility data. It provided spaces for energy suppliers names and the participants account number(s). These were both very valuable in the smooth transfer of data from the correct utility. The ELCAP waiver, being designed primarily for a different purpose, did not include this information. Fortunately each utility has some method of cross referencing names with accounts. Although this may have slowed the process at times, there were no known instances of the lack of an account number causing a loss of data.

4.2 UTILITY - CUSTOMER MATCH

Early in the project a subcontractor was used to perform a Zip Code to utility match for each of the residential participants. This was done for both PNWRES and ELCAP since some of the PNWRES participants did not include supplier information and in some cases the information provided was incorrect or not usable. Initially a total of over 300 PNWRES and over 400 ELCAP residential sites were thought to have valid useful waivers. Many of these sites were duplicates of each other (i.e. a majority of the ELCAP sites were recruited from the PNWRES sample). Based on the initial sorting process and additional waivers added later a total of over 500 residential waivers were available for requests of data from utilities.

In some service areas where utility supply overlaps or is intermingled, an exact match could not always be made. In most cases a best guess was used and the waiver sent to that utility. In cases of a mismatch the primary utility was often able in their data response to suggest an alternative. In a few cases (6 - 10) we were redirected two and sometimes three times due to close proximity of service areas and transfer of service area to other utilities.

The commercial participants (all ELCAP) were located in specific cities with easily identifiable utilities. These were matched with utilities soon after all of them were obtained from the participants. While the matching of utilities was straightforward, the identification of accounts was more time consuming. Many commercial enterprises evolve both in terms of energy supply and business identification. In many cases a commercial site had more than one electrical service and hence multiple accounts. In some cases these were initiated at separate times and for different purposes leading to slightly or completely different account names. In other cases a business name only change could also cause a loss of continuity of account numbers. For some of the cases the electric meter information collected during the ELCAP audits was used to help identify accounts. In other cases utility cross references were used to assure all accounts were included.

No waivers were needed for the Hood River data since it was already collected and presented to us on tape for direct input to the database.

4.3 UTILITY COMMUNICATION

In the early stages of the UIN process a series of phone calls to the various utilities in the Northwest provided the initial contact with potential data suppliers. The actual requests for billing data went out to the utilities in the form of letters detailing the billing project and the kind of data requested. Through the various stages of requests the letter format remained fairly consistent (see Appendix B for copies of various letter formats). Occasionally a utility representative would call with questions concerning the data requested or to inform us of a mismatch of a customer with their utility. In addition it was found useful on several occasions to contact utility representatives directly by phone with regards to the meaning of many of the codes used on the various billing formats.

5.0 UTILITY RESPONSE

5.1 REACTION TO REQUESTS

In general the utilities contacted were cooperative and had no problems with the sending of customer data. after receiving the reminder letter sent out in August of 1988, a few (4 -6) utilities indicated that they were unable to respond immediately but would try to get to it as soon as possible. In a few cases (smaller utilities) there was some resistance in terms of the time it might take to produce the records we needed. This was in most cases understandable in view of the low levels of manpower in some of the smaller operations. One smaller utility did invoice for labor hours spent in retrieving the data for us. The number of records requested from them was small and the equally small charge was paid for both the first and second rounds of requests. A few of the utilities expressed an interest in possible future access to the completed database and were referred to BPA for that access.

By the end of the project only 6 utilities had never responded to our data requests. They were estimated to service only 13 residential customers. In addition virtually all of the 6 utilities were small and located in multiple service areas. No cases are known of any records being sent to us after our cutoff of the end of 1988. The utilities were either able to send their records by then or were otherwise unable or unwilling to do so at all.

It is conjectured that a majority never responded due to lack of information to send or inability to locate any records.

There were no notable problems encountered with any specific utilities that caused a need to change the procedure for requesting records. Requests for data of this kind are relatively straight forward for most utility organizations but usually come in relatively small quantities.

5.2 RESPONSE FORMATS

In requesting billing data from many different utilities we had to be prepared to deal with a variety of billing and rate formats. In addition we could expect to encounter different forms of transfer of this data. A form was included with the original request letters for utilities sending tape or diskette data to indicate the form of data transfer such as spreadsheet, database, tape type, etc. It turned out that the actual billing format was as important to our programming for data encoding as was this transfer type information.

Data was received from utilities on magnetic tapes, diskettes and paper copy. Only three sent data on tapes (larger utilities) and one on diskettes. The remaining utilities sent data on a variety of paper printouts, photo copies, microfiche copies and handwritten account sheets. The Hood River Study billing data was received on a tape format that was relatively easy to load into the database.

Since we had asked for data beginning in 1983, many utilities had to retrieve "off-line" or archived data to fill the earlier years. This usually meant microfiche copies or photocopies of older paper records. In some cases the utility deemed these records not retrievable in large quantities (extensive manpower required) and would only send easily attainable "on-line" data.

The ease with which each set of records could be encoded depended on it's quality and complexity. The tape and diskette records would require some initial programming in order to extract the required information and copy it to the database format. Some of the printouts were created with easily understandable formats while others were completely coded and had to be deciphered before input. Copy quality also ranged from neatly handwritten account sheets to very fuzzy strips of microfiche copy.

5.3 DATA STREAMS

For the most part data for a particular residence or commercial building would come in a continuous stream of monthly or bi-monthly data for the time period requested. Two conditions existed, however, that could cause a gap or truncation of the data:

- The waivers used were signed by individual occupants or owners of a particular residence or building. In some cases the individuals we had waivers for did not occupy/own the building during the entire requested period. In this case the utility was legally only allowed to give us data for the periods of occupancy or ownership by those individuals. This would usually cause various forms of gaps or truncations. In one or two cases continuous data was sent for a building even when our waiver was valid for only a portion of the time period. For the most part the utilities would only release information that was covered specifically under the waiver.

- Data for early months/years was not "on-line" or not available causing the data stream to start later than requested. Most utilities with computer billing systems utilized systems that retained between 12 and 24 months of "on-line" data. In some cases additional 12 month periods of data were available on tape or disk storage. In other cases the old records existed only on paper or microfilm. In still other cases the computer systems were not in place as early as 1983 and older records were found in account sheet or meter reading forms. A few utilities operated with no computerized billing but were asked for records on very few sites. The willingness or ability of each utility to retrieve these older "off-line" records varied with each organization. This accounts for the staggering of some start dates for groups of utility records.

6.0 DATABASE FORMAT

6.1 BILLING DATA FORMAT

The billing record format was constructed within the CDB framework as a compatible part of the vast array of other building characteristics data for

ELCAP. The design allows for inclusion of a wide variety of utility billing formats.

Each record covering a specific billing period for a particular building is identified by ELCAP site number (DI) and servicing utility (acronyms and BPA utility number codes are used). Each record contains energy consumption and associated cost as well as fixed or other miscellaneous utility costs. Where applicable, demand values and costs are also included. Another code is used to identify the type of utility rate applied to the billing and a flag is added whenever unusual circumstances in the record may be of interest to analysts. Places for meter numbers and fossil fuel units are also available. A complete detailed description of the various fields and format of this portion of the CDB can be found in Appendix C.

6.2 RATE DATA FORMAT

The utility rate format was also created within the CDB framework to be available for use with other ELCAP data. It was also designed to include virtually any form of rate structure currently in use in the Northwest.

Each rate record is identified by a utility and rate type code. The record includes the associated charges within the rate such as service, energy, demand, lamp, horsepower, etc. Coding is also supplied to identify seasonal and time of day variants. The format allows for inclusion of a variety of rates such as residential, commercial, industrial, irrigation, lighting, etc. The effective dates of each rate are also included. A complete detailed description of the various fields and format of this portion of the CDB can be found in Appendix C.

7.0 DATABASE ENCODING AND CONTENTS

7.1 DATA INPUT METHODS

Before the billing and rate information could be encoded to the database, it had to be reviewed to identify the correct data for input. All of the records required some initial classification work. Each billing record was first coded with utility and site codes based on a name and address matching. Each utility's billing format was then examined to determine the items that were to be encoded and any unusual information to be flagged (estimated billing, taxes, rebates, etc.). In all cases the billing records

were input according to the billing periods represented on the records. Therefore the database contains monthly, bi-monthly, and a few quarterly records. In cases where no meter reading or billing date was given, a system of using either the last day of one month and the first of the next or the 14th and 15th (middle) was chosen depending on other billing period information provided. Similarly each utility's rate schedules had to be coded by utility and rate type. In many cases the billing printouts were initially created for customer use and were easily made ready for encoding with little review. Others were so deeply coded that calls had to be made to utility representatives to get code listings and interpretations. The rate structures were generally in standard formats requiring minimal review effort.

The majority of the tape and diskette records were fairly easily read and after initial programming were easily loaded to the database. One tape (SCL) did require extensive programming. It was sent in a continuous data stream format and required extra effort in identifying the correct values for input.

The actual encoding of the paper billing records was the most tedious of the inputs to the database. These records had to be manually keyed in to the database. For utilities with larger numbers of records this required semi-repetitive input of detailed numbers and other values. It would appear based on this that it is preferable to received all records on tape or diskette. In the cases of large numbers of records within a particular billing format this is certainly true. However, the programming time and effort required for the many different billing formats existing with the utilities may make it impractical for small numbers of records from multiple utilities.

7.2 DATA QUALITY ASSURANCE

Since a majority of the billing records and rates were being manually keyed to the database, a process for checking the data was implemented. The tape and diskette records were verified at the time of input by spot checking printouts of encoded data with the original file. This was considered ample verification since the input was completed automatically by the written programs.

The paper records and rates were the most time consuming to verify. Printouts of the encoded data for each utility were systematically checked

against the paper records. Original records and printouts were placed side by side and visually scanned for apparent errors. In general the errors encountered were few and most did not occur in the specific consumption and cost values. Since much of the header information for each site in a utility was the same, files with this header information were used repeatedly for similar inputs. Most errors were caused by not updating this information when appropriate. For example, the same file heading might be used for all inputs of a particular utility since the utility name and billing format will be the same. However each site number, meter reading dates, etc. may change from record to record and can easily be overlooked.

As corrections were identified, the database files were updated and the data loaded into the database structure.

7.3 QUANTITY OF RECORDS

The completed database contains a variety of billing records from throughout the Pacific Northwest. Over 33,000 monthly, bi-monthly, and quarterly billing records exist in the utility billing database. These records include streams of data of various lengths between September 1981 and September 1988. As discussed earlier the data received from the utility was not always continuous or complete for the time period requested. The listings below indicate the number and type of buildings represented by data in each fuel category.

Electric utility billing records:

- 119 ELCAP commercial buildings
- 360 ELCAP residential buildings
- 145 PNWRES residential buildings
- 62 Hood River Study residential buildings

Gas utility billing records:

- 19 ELCAP commercial
- 10 ELCAP residential
- 25 PNWRES residential buildings

Oil usage records:

- 4 residential buildings

In addition to these billing records the database contains a large representative portion of the electric and fossil fuel rate structures throughout the Northwest. Various rate structures for a total of 53 different utilities are stored in the database.

Appendix A contains more detailed information on the contents of the database. It includes counts of buildings represented per utility, and listings of rates represented for each utility.

7.4 HARD COPY RECORDS

The paper records, magnetic tapes, and diskettes received from the utilities were saved for possible future reference needs of analysts or others. Each set of paper records was retained in it's original mailing package and sorted by utility name. These records along with others pertaining to the billing records effort were transferred to BPA in mid 1990. The magnetic tapes and diskettes received by utilities are maintained at PNL.

7.5 REFERENCE ESTIMATES OF PROJECT HOURS

Future efforts in this area may find it useful to have reference information about the hours expended in the gathering of utility billing records under this project. Estimates of the hours associated with large portions of the entire project are shown in as much detail as possible. Further detail on each individual subtask is not available. Each of these values includes only hours expended in the actual preparation, collection, input, quality checking, and administration of the project and include both technical specialist and technician hours.

- Preparation of Request Process and Contacts 155 hours
- Electric Bills and Rates Procurement and Input 875 hours
- Fossil Fuel Bills/Rates Procurement and Input 90 hours
- Hood River Data and Miscellaneous Database and Formatting Activity 40 hours

These values **do not** include oversight management, computer charges, overhead, supplies, or other miscellaneous costs.

8.0 POSSIBILITIES FOR FUTURE WORK

The utility billing databases as they currently exist are a valuable resource to analysts and researchers. Possible future work with these databases could involve additions or enhancements to the existing data. Other efforts might be centered around use of the existing data along with additional information in various analysis projects.

The addition of more recent data would enhance the usefulness of the databases by keeping pace with the end use data being currently collected for certain ELCAP sites and increasing the long term picture of energy use in the remaining buildings. Only active ELCAP sites (reduced in number since 1988) would have current waivers and the PNWRES waivers were originally set up to be valid only through December of 1990. This means that additional effort would be needed to collect billing data for the entire set of buildings currently in the billing database. The collection of current rate records would not present the same problems since waivers would not be needed. As a continuation of these sets of data, a collection of similar data from other areas across the country could be added. This would of course require a great deal of effort and organization.

APPENDIX A

DATABASE CONTENTS

APPENDIX A

This first table includes specific information on the numbers of buildings represented by billing data in the database. It includes splits by utility as well as type of building and fuel usage. Note that buildings counted under the gas or oil fuel types are most likely also counted under electric.

Table A.1 Counts of Buildings With Billing Data by Utility and Type.

DATASET UTILITY CODE	BPA UTILITY CODE	ELECTRIC				GAS		OIL
		PNWRES	RES	HOODR	COMM	G-RES	G-COM	O-RES
ANGEL	170	1						
ASH	103	5	2					
B-PUD	203		4					
BFLAT	480	3	2					
BLACH	309	4	1					
CASHM	NA	1						
CEC	312		1					
CHEWE	NA	1						
CHPUD	210	1	7					
CLALL	213	4	5					
CLARK	216	2	8					
CLPUD	207	1	4		4			
CNG	NA					9	4	
COLBS	318	3	5					
CONSU	327		1					
COULE	125	1						
CPN	327	1	4			2		
ELM	334	1	4					
EMEC	335		3					
EWEB	137				5			
FALLR	337	1						
FLAT	339	3	4					
FORGV	142	3	8					
FRPUD	233	1	6					
GLACR	340	1						
IFALL	152	2	7		9		5	
IMG	NA					1	5	
INLND	348		1					
IPCO	530	6	24					
KOOT	351		1					
LEC	354		1					
LEEHT	NA							1
LOSTR	359		4					

Table A.1 (continued)

DATASET UTILITY CODE	BPA UTILITY CODE	ELECTRIC				GAS		OIL
		PNWRES	RES	HOODR	COMM	G-RES	G-COM	O-RES
LOWER	360		5					
MIDST	361	2	4					
MILTF	159	3	15					
ML&P	545		1					
MONMT	163	3	2					
MPC	551	7	16			7		
MPUD3	258	4	3					
NESPE	367	1	1					
NWNG	NA					9	3	
OHOP	372	1	3					
ORCAS	376	6	6					
PACHT	NA							1
PENIN	374		1					
PGE	575	5	23					
PPL	560	20	44					
PSP&L	580	11	21		6			
RAVAL	380	2	6					
RICH	175	6	14		8		2	
ROSOE	NA							1
SCL	180	2	12		80			
SE	383		1					
SERFL	NA							1
SKPUD	279	5	5					
SNOHO	283		18		6			
SSEL	385		1					
SUB	184	4	3		1			
TCL	188	4	13					
UECA	388	2	1					
UP&L	585	1	4					
VERA	191		7					
WEISR	197		5					
WKPUD	293	2	2					
WWP	590	8	16			7		
HOOD	NA			62				
TOTALS		145	360	62	119	35	19	4

Notes for Table A.1:

PNWRES includes non-metered residential buildings.

RES includes ELCAP metered residential buildings.

HOODR includes Hood River Study buildings (metered by others).

COMM includes ELCAP metered commercial buildings (from BASE, CAP, and PES studies).

G-RES includes ELCAP metered residential buildings with gas use.

G-COM includes ELCAP metered commercial buildings with gas use.

O-RES includes ELCAP metered residential buildings with oil use.

Tables A.2a and A.2b provide a listing of the different types of utility rates available in the database for each utility. Total counts of each type of rate is also provided. The variations in rates ("COM" through "COM5", etc.) represent different types of that basic rate. The variations between utilities is not necessarily consistent. For this reason most of these varieties need to be individually assessed.

Table A.2a Counts of Rates in Database by Utility and Type (partial).

DATASET UTILITY CODE	BPA UTILITY CODE	COMMERCIAL						IRRIGATION			
		COM	COM1	COM2	COM3	COM4	COM5	IRR	IRR1	IRR2	IND
ANGEL	170	1									
ASH	103	1									
B-PUD	203										
BFLAT	480	1						1			
BLACH	309										
CASHM	NA										
CHEWE	NA										
CHPUD	210	1	1	1				1			
CLALL	213	1						1			
CLPUD	207	1	1								
COLBS	318										
COLRV	NA	1						1			1
COULE	125	1						1			
CPN	327	1									
ELM	334	1									
EMEC	335										
EWEB	137	1									
FALLR	337	1						1			
FLAT	339	1						1			
FORGV	142										
FRPUD	233	1						1	1		
GLACR	340	1						1			
IFALL	152	1									1
IPCO	530										

Table A.2a (continued)

DATASET UTILITY CODE	BPA UTILITY CODE	COMMERCIAL						IRRIGATION			
		COM	COM1	COM2	COM3	COM4	COM5	IRR	IRR1	IRR2	IND
KOOT	351										
LOSTR	359	1	1					1			
LOWER	360	1						1			1
MIDST	361	1	1					1			1
MILTF	159	1	1					1			
ML&P	545										
MOD	NA	1									
MONMT	163	1									
MPC	551										
MPUD	258										
NESPE	367	1						1			
OHOP	372										
ORCAS	376	1									
PENIN	374	1									
PGE	575										
PP&L	NA										
RICH	175	1	1								
SCL	180	1									
SE	383	1									
SKPUD	279	1									
SNOHO	283	1									
SSEL	385										
SUB	184	1	1								
TCL	188										
UECA	388	1						1			
UP&L	585		1	1	1	1	1		1	1	1
VERA	191										
WKPUD	293	1	1					1			
WWP	590										
TOTALS		33	9	2	1	1	1	16	2	1	5

Table A.2b Continuation of Table A.2a.

DATASET UTILITY CODE	BPA UTILITY CODE	RESIDENTIAL					EX-LIGHTS			
		RES	RES1	RES2	RES3	RES4	EXL	EXL1	SEA	GRES
ANGEL	170	1								
ASH	103	1								
B-PUD	203	1								
BFLAT	480	1	1							
BLACH	309	1								
CASHM	NA	1								
CHEWE	NA	1								
CHPUD	210	1	1				1	1		
CLALL	213	1	1							
CLPUD	207	1					1			
COLBS	318	1								
COLRV	NA	1					1	1		
COULE	125	1						1		
CPN	327	1								
ELM	334	1								
EMEC	335	1								
EWEB	137									
FALLR	337	1						1	1	
FLAT	339	1						1	1	
FORGV	142	1								
FRPUD	233	1								
GLACR	340	1					1		1	
IFALL	152	1								
IPCO	530	1	1							
KOOT	351	1								
LOSTR	359	1					1	1	1	
LOWER	360	1	1				1		1	
MIDST	361	1					1			
MILTF	159	1					1	1	1	
ML&P	545	1								
MOD	NA	1								
MONMT	163	1					1	1		
MPC	551	1								1
MPUD	258	1	1							
NESPE	367	1								
OHOP	372	1								
ORCAS	376	1								
PENIN	374	1					1			
PGE	575	1								
PP&L	NA		1	1	1	1				
RICH	175	1								
SCL	180	1								
SE	383	1								
SKPUD	279	1					1			

Table A.2b (continued)

DATASET UTILITY CODE	BPA UTILITY CODE	RESIDENTIAL					EX-LIGHTS			
		RES	RES1	RES2	RES3	RES4	EXL	EXL1	SEA	GRES
SNOHO	283									
SSEL	385	1								
SUB	184	1					1	1		
TCL	188	1								
UECA	388	1					1		1	
UP&L	585	1	1				1	1		
VERA	191	1								
WKPUD	293	1					1	1		
WWP	590									1
TOTALS		49	8	1	1	1	15	11	7	2

Notes for Table A.2a and A.2b:

COM - COM5 includes standard commercial building rates. The variations are usually based on size of demand or consumption.

IRR - IRR2 includes irrigation (pump) rates and may vary by pump size.

IND includes industrial rates for manufacturing and other process accounts.

RES - RES4 includes residential rates. Variations may include low income, senior discount, or demand.

EXL - EXL1 include exterior (yard) and street lighting. Variations may include municipal and parking lot rates.

SEA includes seasonal operation, summer residence, etc.

GRES includes residential natural gas rates.

APPENDIX B

WAIVER AND LETTER EXAMPLES

AUTHORIZATION FORM FOR UTILITY CONSUMPTION INFORMATION

Department of Energy
Bonneville Power Administration
P.O. Box 3621
Portland, Oregon 97208

I hereby give permission to the company or companies listed below to provide information to Battelle - Pacific Northwest Laboratories for use in connection with their survey for the Bonneville Power Administration.

Bonneville Power Administration is collecting this information pursuant to the Pacific Northwest Electric Power Planning & Conservation Act.

This authorization covers the quantity and price of electricity and natural gas purchased by my household beginning January 1983, and continuing through December 1990. Included may be information pertaining to energy audits, or other utility-sponsored programs participated in by my household. Companies are authorized to provide the occupant name, street address, city, state, and zip code for the service address listed below. Companies are authorized to provide this information by monthly or bimonthly periods, whichever applies.

A photocopy of this authorization may be accepted with the same authority as the original.

I understand that this energy quantity and price information will be linked with my answers to the interview questions. I also understand that the energy information and interview answers may be provided to my local electric utility or natural gas company (where applicable), and that these companies may be able to identify me. However, this information shall be used for statistical purposes only. Subject to Federal law, my name will never be published as a participant in this survey and I will never be contacted for advertising or promotional purposes. The electric utility or natural gas company agrees to limit access to this information and to treat me no differently than they do all of their residential customers.

I understand that I may be contacted in future surveys conducted for the Bonneville Power Administration. My participation in those future surveys will be completely voluntary and independent of my participation in this survey.

I have read and understood the above statements and agree to their provisions.

Date: 11 July 85 Signature: [redacted]

PLEASE PRINT

BILLING NAME [redacted]

SERVICE ADDRESS [redacted] APT. NO. _____

CITY [redacted] STATE [redacted] ZIP [redacted]

TELEPHONE ([redacted]) [redacted]
AREA CODE NUMBER

PLEASE COMPLETE ONE BLOCK BELOW FOR EACH FUEL USED BY YOUR HOUSEHOLD.

ELECTRICITY

PRINT FULL NAME OF ELECTRIC COMPANY: IDAHO POWER COMPANY

ACCOUNT NUMBER: [redacted]

NATURAL GAS FROM UNDER-GROUND PIPES

PRINT FULL NAME OF GAS COMPANY: N/A

ACCOUNT NUMBER:

(A1/2)

Rev. 2
11/16/84

COOPERATIVE AGREEMENT
END-USE LOAD AND CONSERVATION ASSESSMENT PROGRAM
(COMMERCIAL)

THIS COOPERATIVE AGREEMENT is made between the PACIFIC NORTHWEST LABORATORIES, BATTELLE MEMORIAL INSTITUTE, a corporation organized and existing under the laws of the State of Ohio, with principal offices in the City of Columbus, Ohio (Battelle), and [redacted], (a corporation, sole proprietorship, partnership, individual, joint venture) located in the City of Seattle (Permitor).

The Permitor is the owner or owner representative of the [redacted] building at [redacted] (Building).

Battelle in the performance of its Prime Contract DE-AC06-76RLO 1830 with the United States Department of Energy (DOE) is performing a research project to assess the end-use of electrical power in commercial and residential buildings in the Bonneville Power Administration (BPA) service region. The results will be used to assess the accuracy of estimates in conservation potential and to establish a data base of electrical end-use.

A. The Permitor hereby agrees to permit Battelle, its authorized representatives, and subcontractors to:

   1. collect data about price and usage (energy-use) from the Permitor's energy suppliers

   2. perform energy audits (audits)

   3. gather energy consumption and determinant data through computerized monitors attached to the Building's energy system (metering) which may require the temporary interruption of electrical service.

B. Project activities are subject to the following conditions:

   1. Activities shall commence on or after Jan 1, 1985.

   2. Battelle responsibilities shall be transferrable to the BPA at any time.

   3. The Permitor shall not bear any costs of the installation, maintenance, or removal of metering equipment.

   4. Battelle will comply with Federal, State and local safety; employer liability; workers' compensation; and building and electrical codes, laws, rules and regulations.

   5. Project equipment installed by Battelle will be and remain the responsibility of Battelle until transfer (assignment) to the BPA. The Permitor has no liability or responsibility for installed equipment.

0200A

A2/2

6. The Permitor shall provide a designated contact with whom Battelle can coordinate project activities in the Building, and any interaction with the Building's tenants affected by the project.

7. The Permitor agrees not to disturb installed equipment in any way, unless authorized by Battelle or as may become necessary for safety.

8. The Permitor agrees to coordinate with Battelle any changes in maintenance practices or physical alterations that could affect energy usage in the Building for the term of this Agreement.

9. Battelle will not publicize the Permitor's participation in the project. All data gathered becomes the property of DOE.

10. Permitor shall not use Battelle's name or identifying characteristics for advertising, sales promotion or other publicity purposes.

C. Battelle shall indemnify and save harmless the Permitor, its officers and employees against any and all claims, attorney's fees and court costs, for injury (including death) or damage to Permitor's property caused by the negligence or willfull misconduct of Battelle's employees or subcontractors in designing, installing, repairing, checking, or using the metering equipment attached to the Permitor's energy system. The foregoing indemnity shall be limited in amount to the payments made or proceeds received by Battelle from the Continental Insurance Company under Policy No. L1311230 and Interstate Fire and Casualty Company under Policy No. 55-C2044267.

D. In consideration for the cooperation herein the Permitor shall be provided a summary report of the energy-use, audit, and metering results concerning its Building at the conclusion of this portion of the project.

E. Either party may terminate this Agreement by providing ninety (90) days' written advance notice to the other party.

Each signer of this Agreement has the authority to execute and bind the party involved and warrants that there are no other agreements, express or implied, which are not contained in this Cooperative Agreement or incorporated specifically by reference.

[redacted]

BATTELLE MEMORIAL INSTITUTE
PACIFIC NORTHWEST LABORATORIES

By Dean H. Glazier

Title Subcontract Specialist

Date 3/6/5

Certify

By [redacted]

Title [redacted]

Date [redacted]

Certify [redacted]

0200A

B1/2

August 6, 1986

Battelle
Pacific Northwest Laboratories
P.O. Box 999
Richland, Washington U.S.A. 99352
Telephone (509)
Telex 15-2874

Richard Wickwire
Utility Engineer
City of Ellensburg
420 North Pearl Street
Ellensburg, WA 98926

Dear Mr. Wickwire:

RE: REQUEST FOR BILLING INFORMATION FOR A RESIDENTIAL ELECTRICAL ENERGY USE STUDY

Thank you for agreeing in our phone conversation August 5 to assist Pacific Northwest Laboratory with the collection of electrical billing history and related information from BPA survey participants. The information that you provide will be invaluable to PNL in its BPA-sponsored studies.

Enclosed with this letter is a billing record waiver signed by the participating customer. The information requested is as follows:

- service address
- account address, if different than service address
- account name
- account number
- meter number
- beginning and end dates for each billing period
- meter reading, or total kWh, for each billing period
- total charges, minus repair and special service fees, for each billing period
- applicable rate schedule
- description of conservation, loan, and incentive program(s) participated in (if known) (see Form 1). This is information that may affect individual patterns of consumption and alter energy costs.

We are requesting information for this residence from January 1, 1983 (or date of initial occupancy, if built after 1/1/83), through the most recent billing. We're hoping to receive the information by the end of August.

B2/2

Battelle

Two short forms are also enclosed for your convenience. Form 2 requests information on energy conservation programs, utility audits, and utility-sponsored incentive programs offered through your service district; and rate schedule and billing period. Form 3, to be used only if you are sending data by floppy disk or tape, requests information to facilitate transfer of the data.

We appreciate Ellensburg's cooperation in supplying us with billing records for this residence. If you have questions regarding anything discussed in this letter, please feel free to call.

Sincerely,

Susan E. King
Research Specialist
(509) 376-8481

Enclosures

cc: [redacted] PNL

C1/2

Battelle
Pacific Northwest Laboratories
P.O. Box 999
Richland, Washington U.S.A. 99352
Telephone (509)
Telex 15-2874

August 14, 1986

Ms. Colleen Cleary
Conservation Division
Seattle City Light
1015 Third Ave.
Seattle, WA 98104

Dear Ms. Cleary:

I would like to thank you for your recent help in providing billing records for the End-use Load and Conservation Assessment Program (ELCAP) residential study sponsored by the Bonneville Power Administration (BPA). As I mentioned in our phone conversation of July 7, Battelle, Pacific Northwest Laboratories is also in the process of acquiring billing records for the BPA sponsored ELCAP Commercial Base and Purchase of Energy Savings (PES) studies (ref: Sue F. Hickey's letter to Mr. Randall Hardy dated June 17, 1985). I am writing to you to complete our initial requests to Seattle City Light for billing records for the ELCAP studies. It is our intention that these commercial billing requests encompass the remainder of the building sites for which we are seeking records. The only additional requests for these particular buildings would come in the form of annual updates to correspond with the end use data we are collecting on site.

The records requested here are of particular interest in that they will become a part of a unique in-depth metering study of close to 100 commercial buildings in the Seattle area. Besides contributing to the development of a regional model of energy use for commercial buildings, it can provide a specific look at commercial energy use and characteristics for your specific climate and demographic situation. This study along with others sponsored by BPA will be of great value in support of comprehensive regional energy management.

The information we are requesting is needed as soon as it is practical to provide (by late August if possible) and should include records from January 1983 to present. If applicable, please provide the following for each customer:

- service address(s)
- account address
- account name
- account number(s)
- meter number(s)
* - consumption per billing period per meter
* - associated cost per billing period per meter

c2/2

2

* - demand reading per billing period per meter
- flat rate charges such as parking lot lights, etc.., if any
- information on conservation programs, rate structures (including demand billing), changes in billing periods, etc.. which might effect consumption or cost patterns.

(*) - Actual Read Dates would be helpful for these items.

In addition, I am enclosing three forms that ask for general information on utility programs, rates, etc.. and data transmittal. This information would be greatly appreciated if applicable to your utility.

As we discussed on the phone, I am enclosing a list of the meters that correspond to the building sites we are studying and the date that each access agreement (release of information waiver) was signed. Also enclosed are representative waivers. Also as discussed, someone from each of our organizations will be in contact with each other to arrive at a data exchange system that will be easy for you to implement and be compatible with our retrieval capabilities. Please let me know as soon as possible whom we should contact to arrange the data transfer. As stated in previous contacts, we are committed to customer confidentiality and continue to treat all customer related information as "business sensitive".

We deeply appreciate your willingness to work with us on these studies. If you have any questions please feel free to contact me at (509) 376-4362.

Sincerely,

Eric E. Richman
Research Specialist
(509) 376-4362

cc: RF Darwin

(D½)

Battelle
Pacific Northwest Laboratories
P.O. Box 999
Richland, Washington U.S.A. 99352
Telephone (509) 375-3655
Telex 15-2874

bcc: RG Pratt
File/lb

February 4, 1987

Mr. Paul Davies
Conservation Manager
Central Lincoln PUD
P.O. Box 1126
Newport, Oregon 97365-0090

Dear Mr. Davies:

As you know, Battelle Pacific Northwest Laboratory is currently collecting billing information for a Bonneville Power Administration (BPA) sponsored energy use study. We sincerely appreciate the help you have been providing by supplying residential billing data on some of your customers. I am writing today to ask your assistance in gathering billing records for four (4) commercial customers that are in your service area.

The records requested here are of particular interest in that they will become a part of a unique in-depth metering study of over 120 commercial buildings in the northwest. Besides contributing to the development of a regional model of energy use for commercial buildings, it can provide a specific look at commercial energy use and characteristics for your specific climate and demographic situation. This study, along with others sponsored by BPA, will be of great value in support of comprehensive regional energy management.

The information we are requesting is needed <u>as soon as possible</u> (we need to start using this data by February 10, 1987). Please note: we are only in need of data for these customers from January to July of 1983, <u>and</u> March of 1986, to present if available.

If applicable, please provide the following for each customer:

- service address(s),
- account name,
- meter number(s),
* • consumption per billing period per meter,
* • associated cost per billing period per meter,
* • demand reading per billing period per meter.

* Actual <u>Read Dates</u> would be helpful for these items.

D2/2

Battelle

Enclosed are copies of signed "Access Agreements" that include billing information waivers for each customer. As a research organization, Battelle is committed to customer confidentiality. All customer related information you provide will be treated as "business sensitive" and used primarily as "nameless" data.

We deeply appreciate your willingness to work with us on these studies. If you have any questions, please feel free to contact me at (509) 375-3655.

Sincerely,

Eric E. Richman
Research Specialist
Applied Physics Center

EER/cjb
clpudcap.ltr

Battelle
Pacific Northwest Laboratories
P.O. Box 999
Richland, Washington U.S.A. 99352
Telephone (509) 375-3655
Telex 15-2874

September 18, 1987

Pacific Heating Oil
3643 Woodland Park N.
Seattle, Washington 98103

Bcc: WF Sandusky
File/LB

Dear Sirs,

Battelle, Pacific Northwest Laboratories is currently collecting fuel usage information from Northwest gas and oil suppliers that serve participants in a Department of Energy (DOE) sponsored energy use study. I am writing you to ask your assistance in gathering billing records and rate information for the participants that are in your service area.

Enclosed is a copy of a signed "access agreement" for the customer that includes a billing information waiver giving us permission to collect the data. As a research organization, Battelle is committed to customer confidentiality. All customer related information you provide will be treated as "business sensitive" and used primarily as "nameless" data.

We are gathering billing records for the time period of January 1983 to present and would appreciate any records in this time frame that are practical to send. If applicable, please provide the following for the customer identified on the attached document:

- service address(s)
- account name
- meter number(s)
* - consumption per billing period per meter
* - associated cost per billing period per meter
* Actual Meter Read Dates would be helpful for these items.

In addition, we would appreciate copies of your billing rate structures covering the same time period.

This information is needed as soon as it is practical to send.

We deeply appreciate your assistance with this study. If you have any questions please contact me at (509) 375-3655.

Sincerely,

Eric E. Richman
Technical Specialist
Building Sciences Section
Applied Physics Center

EER/skp
Pacific.Ltr

Enclosure

Battelle
Pacific Northwest Laboratories
P.O. Box 999
Richland, Washington U.S.A. 99352
Telephone (509) 375-3655
Telex 15-2874

September 18, 1987

Bcc: WF Sandusky
File/LB

Mr. Robert Gruber
C.P. National
P.O. Box 1709
Medford, Oregon 97501

Dear Mr. Gruber:

Battelle, Pacific Northwest Laboratories is currently collecting fuel usage information from Northwest gas and oil suppliers that serve participants in a Department of Energy (DOE) sponsored energy use study. I am writing you to ask your assistance in gathering billing records and rate information for the participants that are in your service area.

Enclosed are copies of signed "access agreements" for each customer that include billing information waivers giving us permission to collect the data. As a research organization, Battelle is committed to customer confidentiality. All customer related information you provide will be treated as "business sensitive" and used primarily as "nameless" data.

We are gathering billing records for the time period of January 1983 to present and would appreciate any records in this time frame that are practical to send. If applicable, please provide the following for customers identified on the attached documents:

- service address(s)
- account name
- meter number(s)
* - consumption per billing period per meter
* - associated cost per billing period per meter
* Actual Meter Read Dates would be helpful for these items.

In addition, we would appreciate copies of your billing rate structures covering the same time period.

We deeply appreciate your assistance with this study. If you have any questions please contact me at (509) 375-3655.

Sincerely,

Eric E. Richman
Technical Specialist
Building Sciences Section
Applied Physics Center

EER/skp
National.LTR

Enclosures

E1/2

May 19,1988

Mary Grady, Project Mgr Load Research
P.O. Box 97304 / Mail Stop OBC-OBE
375-3655
Bellevue, WA 98009-9734

Dear Ms. Grady,

As you are aware, Battelle Pacific Northwest Laboratory is currently collecting billing information for a Bonneville Power Administration (BPA) sponsored energy use study. Your assistance in the past in providing us with billing records is greatly appreciated. In order to have billing data available for this last heating season, BPA has asked us to gather data from where we were last able to collect through the present for the sites you assisted us with in the past. In addition there may be some sites that were missed entirely before for which we could use data from January 1983 to the present. I am writing today to ask your assistance in gathering these additional records for those customers in your service area that are part of our study.

The information we are requesting is needed <u>as soon as possible</u>. If available, please provide the following for the time period of April 1986 to present for residential customers, May 1985 to present for commercial accounts(if any), and January 1983 to present for sites missed before(if any). Those missed before have a **red** dot on the "Access Agreement"(see below).

- service address(s),
- account name,
- meter number(s),
- * consumption per billing period per meter,
- * associated cost per billing period per meter,
- * demand reading per billing period per meter.

* Actual <u>Read Dates</u> would be helpful for these items.

Enclosed are copies of the signed "Access Agreements" that include billing information waivers for each customer. As always, all customer related information you provide will be treated as "business sensitive" and used primarily as "nameless" data. If you have any questions, please feel free to contact me at (509) 375-3655.

Sincerely,

E2/2

Eric E. Richman
Technical Specialist
Applied Physics Center

EER/LLL
form.ltr

Enclosure

August 16, 1988

Pend-Orielle County P.U.D.
Jim McCampbell, Manager
Box 190 / 130 North Washington Ave.
Newport, WA 99156

Dear Mr. McCampbell,

As you may be aware, Battelle Pacific Northwest Laboratory is currently collecting billing information for a Bonneville Power Administration (BPA) sponsored energy use study. On May 19 of this year I wrote to you asking for your assistance in supplying billing data for certain study participants in your service area. Since I have not heard from you and the billing database is nearing completion, I am writing again to inquire about any records you may be able to send. If there is any additional information or other assistance I can provide please contact me at (509)375-3655. I look forward to hearing from you at your earliest opportunity.

Sincerely,

Eric E. Richman
Technical Specialist
Applied Physics Center

EER
bill2.ltr

APPENDIX C

DATABASE BILLING AND RATE FORMATS

8.0 UTILITY DATA

8.1 UTILITY_BILLING

Following is a list of fields for the UTILITY_BILLING relation. Included are electricity, gas and oil billing records for various Residential and Commercial sites. Each record covers one billing period. The following codes apply in all cases:

-99 = Missing value for integer.
-99.99 = Missing value for dollar amount.
* = Missing value for text.

1. SITE - The unique number assigned to the site.

2. UTILITY - The BPA three digit code for the utility from which this site gets its electricity. The codes are listed in Appendix B.

3. UTILITY_CODE - A 1-5 character code used to describe a utility.

4. BEGIN_DATE - Date billing or usage period began.

5. END_DATE - Date billing or usage period ended.

6. KILOWATT_HOURS - Kilowatt hours used for billing period.

7. DOLLAR_AMOUNT - Total charges associated with utility bill. Includes service charges, minimums, and tax, if any as well as power usage.

8. FLAG - A five character code used to describe begin and end dates.

   READ = Dates are known read dates or estimated read dates (within 3 days of actual).
   BILL = Dates are known bill dates, estimated bill dates (within 3 days of actual) or dates not assured to be read dates.
   READX
   BILLX = Dates as described above. X indicates unusual circumstances (i.e. tax, meter change, occupant change, estimated values, miscellaneous charges, mixed dates, etc.).

9. CODE - The type of rate applied.
   RES = Regular residential.
   RES1 = Special residential (i.e., senior citizen discount).

   GRES = Residential gas.
   ORES = Residential oil.
   COM = Regular commercial.
   COM1 = Special commercial (i.e, KVA, larger user).
   GCOM = Commercial gas.

OCOM = Commercial oil.
IND = Industrial (Separate from commercial).
IND1 = Special Industrial.
SEA = Seasonal/Summer residence/Stock wells/Cabins.
SEA1 = Special Seasonal, etc.
IRR = Irrigation.
IRR1 = Special Irrigation.
EXL = Exterior lighting (usually residential).
EXL1 = Exterior lighting (usually governmental street lighting)

10. KWH_DOLLARS_AMOUNT - Charges for kilowatt hours used - usually applicable for commercial sites.

11. KILOWATTS - Kilowatts used for billing period if applicable (usually commercial).

12. KILOWATT_DOLLAR_AMOUNT - Charges for kilowatts used during billing period - usually applicable for commercial sites.

13. METER_NUM - At times more than one utility meter may be present at a site. A meter number may be included to indicate with which meter the data on a specific record is associated..

14. GAS_OIL_USAGE - The number of gas or oil units used.

8.2 UTILITY_RATES

Following is a list of fields for the UTILITY_RATES relation. Included are utility rates from throughout the Pacific Northwest that could apply to sites for which billing data is available. Although all major rate structures are included, set-up charges, miscellaneous rebates, complicated minimums, and seldom used rates are not included.

1. UTILITY - The BPA three digit code identifying the utility to which a rate belongs. The codes are listed in Appendix B.

2. UTILITY_CODE - A 1-5 character code used to describe a utility.

3. CODE = The type of rate applied.
   RES = Regular residential.
   RES1 = Special residential (i.e., senior citizen discount).
   GRES = Residential gas.
   ORES = Residential oil.
   COM = Regular commercial (small building).
   COM1 = Special commercial (i.e, KVA, larger user).
   GCOM = Commercial gas.
   OCOM = Commercial oil.
   IND = Industrial (Separate from commercial).
   IND1 = Special industrial.
   SEA = Seasonal/Summer residence/Stock wells/Cabins.

SEA1 = Special seasonal, etc.
IRR = Irrigation.
IRR1 = Special irrigation.
EXL = Exterior lighting (usually residential).
EXL1 = Exterior Lighting (usually governmental street lighting).

4. CHARGE_TYPE - A three character code for type of charge.
   SER = Service, basic, or customer charge (usually flat fee per month or year).
   ENG = Energy charge per KWH used.
   DEM = Demand charge per KW for demand level reached.
   TUD = Demand charge per KWH based on Time-of-Use readings.
   RED = Reactive demand charge (usually per KVA over percentage KW) in addition to regular demand.
   LMP = Lamp charge (usually per lamp per month) for exterior lighting.
   HP = Horse power charge (usually per HP per year or month) for irrigation.

5. SEASON_TIME_OTHER - Text to denote season (months), time, or other parameters for applicable rates.

6. USAGE - Text to denote energy usage or other quantity corresponding to rates applied.

7. RATE - Dollar amount charged for unit of usage.

8. BEGIN_DATE - Date rate period began.

9. END_DATE - Date rate period ended.