Oracle Utilities Load Analysis

Load Data Analysis User's Guide

Release 1.11.0.4 for Windows

E18229-06

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Oracle Utilities Load Analysis Load Data Analysis User's Guide, Release 1.11.0.4 for Windows

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Contents

What's New

Introduction

Chapter 1

Chapter 2

Chapter 3

Chapter 4

Chapter 5

Chapter 6

Chapter 7

Chapter 8

Chapter 9

Chapter 10

Chapter 11

Chapter 12

Chapter 13

Chapter 14

Chapter 15

Chapter 16

Chapter 17

Chapter 18

Chapter 19

Chapter 20

Chapter 21

Appendix A

Appendix B

Appendix C

Appendix D

Appendix E

Appendix F

Appendix G

Appendix H

Appendix I

Appendix J

Appendix K

Index

What's New

New Features in the Oracle Utilities Load Analysis: Load Data Analysis User's Guide

This chapter outlines the new features of the 1.11.0.x release of the Oracle Utilities Load Analysis that are documented in this guide.

New Features for Release 1.11.0.4

Feature	Description	For more information, refer to...
Preprocess Key Generator	This enhancement supports including key generator logic in a control file, thereby allowing you to create a list of keys for a program. This enhancement is supported by multiple programs.	**Using the Preprocess Key Generator in a Control File** on page 4-4
Embedded SQL	This enhancement supports querying the database by using SQL statements in control or key list files. This enhancement is supported by multiple programs.	**Querying the Database with Embedded SQL** on page 4-7
New Transformation Function	This enhancement supports a new Prorate function in the transformation program.	**Another Type of Transformation Command — Transformation Functions** on page 15-5

New Features for Release 1.11.0.3

Feature	Description	For more information, refer to...
New Statistic Extraction Program (Y780)	This enhancement supports the new Y780 program which extracts specified cuts or statistics over multiple analysis rate classes over multiple analysis periods into a CSV file that may be imported into a spreadsheet or reporting tool.	**Statistic Extraction Program (Y780)** on page 16-24

New Features for Release 1.11.0.0

Feature	Description	For more information, refer to...
Limits on Analysis Control File Records Removed	This enhancement supports removing the limit of 9,999 records in the control files for analysis programs.	**Step 2: Create the Analysis Control File (TGY31A.CTL or TGY33A.CTL)** on page 7-7 **Step 2: Create the Analysis Control File (TGY38A.CTL)** on page 8-4 **Step 2: Create the Analysis Control File (TGY35A.CTL or TGY36A.CTL)** on page 11-4
Changes to the Key Generator	This enhancement supports the following changes to the Key Generator: • You can use a new SUBSTR function to extract character strings from Key Generator variables. • The variables CUSTIDn and CFIELDn are no longer supported. • The variable TRAILn supports 40 edit trails.	**SUBSTR Functions** on page 14-11 **Appendix K: Key Generator Variable Lists**

Introduction

Is This Guide for You?

The Oracle Utilities Load Data Management and Analysis System is a comprehensive software tool designed to help utilities collect, manage, and analyze reliable load research data.

The Oracle Utilities Load Analysis Load Data User's Guides describe the concepts and procedures involved in working with the Oracle Utilities Load Analysis System. Oracle Utilities Load Analysis Load Data Management User's Guide covers the *Oracle Utilities Load Data Management Subsystem* and is intended for anyone concerned with inputting, editing, managing, and/or reporting load data. This volume, Oracle Utilities Load Analysis Load Data Analysis User's Guide, covers the Oracle Utilities Load Analysis Load Data Analysis Subsystem and is written for utility statisticians and others concerned with applying various statistical analyses to your data in the Oracle Utilities Load Analysis database(s).

While this guide assumes a thorough understanding of statistics, it does not require prior knowledge of Oracle Utilities Load Analysis or load research. It is intended for utility statisticians who are new to the Oracle Utilities Load Analysis system in particular and possibly load research and analysis in general.

How To Use This Guide

How you use this guide is up to you. You can either read the guide from beginning to end, or skip ahead to those chapters that pertain to your area of interest. (Each chapter begins with a brief overview of its contents, so you can quickly determine whether or not it is appropriate to your needs.) If you are a new Oracle Utilities Load Analysis user, however, it is recommended that you read all of the chapters in sequence.

Examples are provided throughout the guide to help you understand how the system works.

What You Should Know Before Getting Started

This manual is not intended to teach you the basics of using your computer or operating system. If you need help with this, contact your facility's system manager.

Conventions Used in This Guide

The formats for creating input files are illustrated in boxes throughout the guide. Within these boxes, the following conventions are used:

- Key words that you will enter appear in the guide as a combination of upper- and lowercase letters. Typically, you need enter only the first three letters, which appear in uppercase.
- Parameters you will enter appear in italics.
- Braces { } are used to indicate a choice of parameters, from which you must choose one.
- Brackets [ ] are used to indicate optional parameters that you may or may not use.
- Vertical bars | separate mutually exclusive choices.
- Default parameter values (the values the Oracle Utilities Load Analysis system will use when you do not supply other values) are underlined.
- /* — the slash-asterisk combination identifies comments that do not affect processing. These comments are included in the sample files shown in this manual to help you understand the examples. You can include similar comments in your own files by observing the following rules:

  If you want to use the "/*" characters without them acting as comment designators, you must precede them with an ampersand: "&/*".

Comments can be included in Control File or Environment File statements. Each comment must begin with "/*".

Throughout the manual, the following naming conventions are used for procedures and files.

ELEMENT	CONVENTION	EXAMPLE	NOTE
Input/Output Files	TGY _ _ _	TGY31A = Standard Load Analysis Control File	File reference recognized by programs.
Application ID (APPLID)	Y _ _ _	Y310 = Standard Load Analysis APPLID	

Other Load Analysis Documentation

Below are descriptions of other documentation that you may find helpful.

- The *Oracle Utilities Load Analysis Quick Reference Guide* — A concise summary of procedure names, input file commands and parameters, standard codes, and other essential information for the basic Oracle Utilities Load Analysis system and its extensions. It is a very useful tool to have at hand while you are working with Oracle Utilities Load Analysis.
- The *Oracle Utilities Load Analysis Load Data Management User's Guide* — The companion to this manual, explains how to apply Oracle Utilities Load Analysis to build and maintain reliable databases of customer interval data for analysis, billing, and other important purposes.
- *Oracle Utilities Load Analysis System Installation Guide/Oracle Utilities Load Analysis Configuration Guide* — Explain how to install, customize, and maintain Oracle Utilities Load Analysis as a standalone system, or as a client/server system.
- *Oracle Utilities Load Analysis User's Guide* — Explains how to use the graphical user interface of Oracle Utilities Load Analysis to "submit jobs" — that is, how to select a desired program, create and specify the necessary configurations, and view the results. This guide covers the mechanics of how to use Oracle Utilities Load Analysis. This guide should be used as a secondary companion piece to the *Oracle Utilities Load Analysis Load Data Management User's Guide* and the *Oracle Utilities Load Analysis Load Data Analysis User's Guide.*

In addition, there is a wide variety of optional programs, called "Bundles," that add additional capabilities to the base Oracle Utilities Load Analysis package. One or more of these programs may be in use at your facility. With the exception of a few programs documented in the Introductory Guides, most of these Bundles are delivered with their own manuals.

How To Get Help

Occasionally, as you work with Oracle Utilities Load Analysis you may encounter an error message or other problem that you cannot decipher on your own. As a Oracle Utilities Load Analysis customer (current, on annual extended maintenance), you can contact Oracle Support personnel at http://metalink.oracle.com.

My Oracle Support offers you secure, real-time access to Oracle experts on the complete Oracle Utilities Load Analysis system. It also provides groundbreaking personalized & proactive support capabilities that help reduce unplanned down time and improve system stability. Leverage the Internet for immediate access to 24/7 support and get the critical and timely information you need for running your business.

Before contacting, please prepare the following information:

- Job directory containing the error
- Anything else that you think might aid in diagnosing the problem.

Chapter 1

Load Research and the Oracle Utilities Load Analysis System

This chapter is a useful introduction for anyone unfamiliar with load research and the Oracle Utilities Load Analysis system. It describes the basic concepts of load research, and explains how accurate load research can benefit a utility and its customers.

The chapter then gives a brief overview of the entire Oracle Utilities Load Analysis System — including the Load Data Management Subsystem, the Load Analysis Subsystem, and the optional Bundles. Topics covered in this chapter are:

- **What Is Load Research?**
- **How Do Utilities Conduct Load Research?**
- **What Does Oracle Utilities Load Analysis Do?**

What Is Load Research?

"Load Research" is a way of determining how a utility's customers use electricity or gas — specifically, *how much* they use and *when*. Accurate load research is critically important to a utility, because it can help ensure cost-effective service, equitable rates, and profitability.

A utility's operations are determined by the amounts and times of customer usage — in other words, by the "load" placed on the utility's system. Customers require different amounts of energy at different times of the day and over the course of the year, and load patterns vary between different types of customers (e.g., commercial, residential, etc.). All of these customer demands combine to create a system load that fluctuates over time. Since energy cannot be stored during times of low consumption and released during times of high use — but instead must be produced as it is needed — a utility is required to build enough capacity to meet the highest load that could occur.

Load research enables a utility to get a precise picture of how its customers use energy. The utility collects "load data" for a representative sample of its customers. Load data recorders measure customer demand at regular, short intervals (typically every 5, 15, 30, or 60 minutes). This data is analyzed and extrapolated to produce "load profiles." Load profiles (Figure 1-1: Load Profile) show how demand varies over different time periods and how each customer class contributes to the total system load. Accurate load research and load profiles can have many different applications, benefiting both the utility and its customers. For example:

- **Rate Design and Cost of Service Studies** — Load patterns cause cost patterns. Since the utility must build enough capacity to meet every customer's needs at the time of system peak, rates are often set according to how each customer class contributes to the peak load. Load research enables the utility to accurately determine how much it costs to provide service to each type of customer — ensuring that rates are commensurate with the level of service.

  Accurate load research helps protect the utility too; once costs are known, rates can be designed to collect enough revenue to cover all costs. In addition, public utility commissions are more likely to grant rate requests when accurate, reliable load data is available.

- **Demand Side Management** — Load research can help a utility and its customers save money too. Once load profiles are understood, customers can be encouraged to shift their usage from on-peak to off-peak time periods. (In other words, the utility can flatten the load profile.) For the utility, this can mean a reduction in maximum capacity requirements and better use of existing resources. For the customer, this can mean lower energy bills

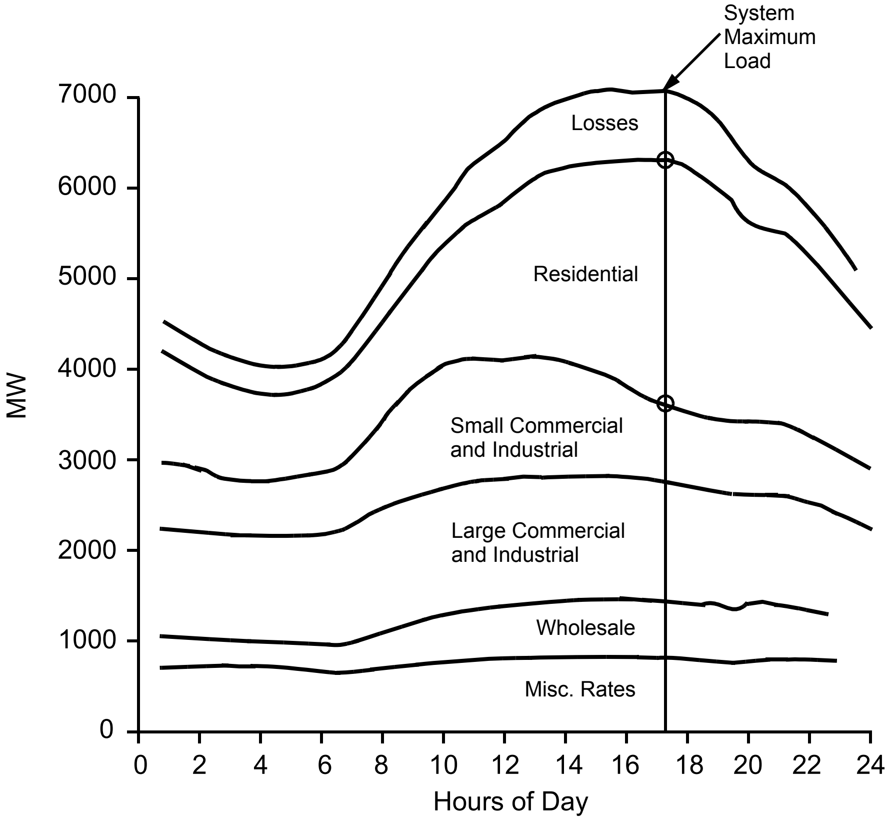


Figure 1-1 Load Profile

Load profiles are developed from load research data. They are very useful for forecasting system capacity requirements, encouraging energy savings through load management, setting equitable rates, and ensuring profitability.

- **Load and Energy Forecasting** — Load research helps utilities understand how different types of customers consume energy at different times (weekday v. weekend, work day v. holiday, winter v. summer, etc.). It helps utilities spot trends and prepare for the future.
- **Transmission and Distribution Planning** — T&D engineers can use load data to more effectively perform system planning, load balancing, and equipment selection.

How Do Utilities Conduct Load Research?

Each utility has its own way of conducting load research, but some general steps can be outlined.

First, the utility identifies its major customer classes — for example, residential, commercial, industrial, and agricultural. Then, a small sample group is identified for each customer class. This is necessary because it is prohibitively expensive to obtain load data for each and every customer. Of course, for billing purposes all customers are metered to determine how much energy they consume during a given time period, such as kilowatt hours per month. While useful to supplement load research, this data is too limited to serve as the foundation for load research applications. Load research requires measurement of demand at regular, short intervals — that is, every 5, 10, 15, 30 or 60 minutes. Such measurement requires more effort and more sophisticated equipment — such as "digital pulse recorders" or "solid state devices." Rather than installing expensive instruments at every customer site, a small but statistically-reliable sample of the total group is selected for monitoring. After the load data has been collected and validated for each sample group, it is analyzed and extrapolated to represent the entire population — providing an accurate picture of the amounts and time of energy consumption by each customer class (Figure 1-1: Load Profile).

For load research analysts, a key challenge is to design samples that will provide accurate pictures without costing a great deal. The number of expensive monitoring devices used to obtain the sample needs to be kept at a minimum, for example.

Traditionally, analysts have designed one sample for each customer class, aiming for accuracy at a particular time period — usually the peak hour of the year. PURPA standards require utilities to achieve at least 90% confidence with a 10% accuracy at the peak hour (the "90-10" rule).

> Note: PURPA — the Public Utility Regulatory Policies Act — was signed into law on November 8, 1978. It established a set of procedures and requirements for state utility commissions and electric and gas utilities and was designed to standardize rate making and encourage conservation.

In today's demanding environment, however, other departments within the company, as well as important customers, are pressing analysts to go well beyond these standards. They need samples that are more accurate and more creative — for example, samples that are accurate for more than one period, such as winter and summer peak hours, and samples that incorporate special characteristics, such as single family homes vs. apartments. Thanks to increasingly sophisticated computer tools such as Oracle Utilities Load Analysis, analysts can respond to such demands.

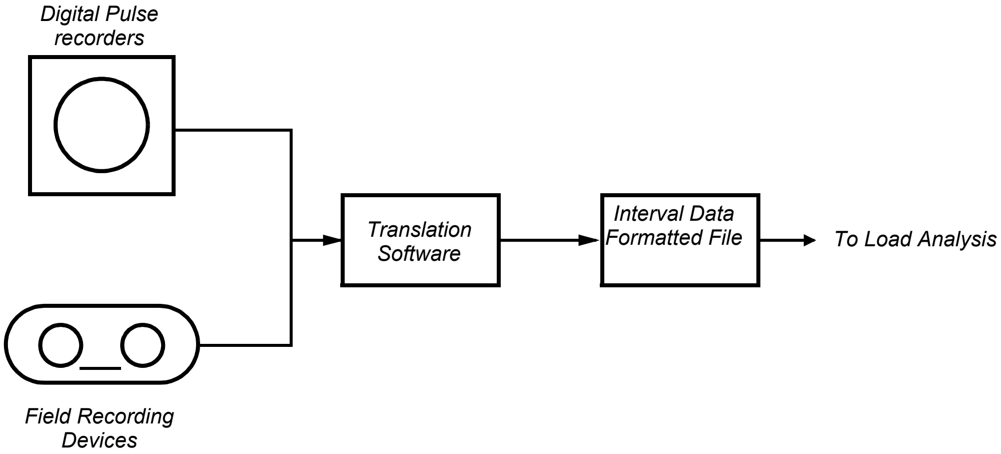


Figure 1-2 Load Data Collection

Recording devices collect interval data for each customer in the sample. The data is gathered (possibly via phone lines or meter readers), translated into a standard format, and fed into a computer where it is tested for accuracy and eventually analyzed.

What Does Oracle Utilities Load Analysis Do?

Oracle Utilities Load Analysis is a software program for the management and analysis of load research data. Originally developed to help clients meet PURPA requirements, Oracle Utilities Load Analysis has been enhanced and expanded over time to become a broad-based system for a variety of load research applications (Figure 1-3: The Oracle Utilities Load Data Management and Analysis System). Oracle Utilities Load Analysis is now in use at more than seventy utilities across the United States and Canada, and is the most widely-used system of its kind.

The basic Oracle Utilities Load Analysis package consists of two subsystems: *Load Data Management* and *Load Data Analysis* (Figure 1-4: Overview of the Oracle Utilities Load Data Management and Analysis System).

The functions of the **Load Data Management Subsystem** are: to accept load data from a variety of sources; to ensure that the data is complete, consistent, and accurate; and to make it available for reporting and analysis (Figure 1-4: Overview of the Oracle Utilities Load Data Management and Analysis System). The **Load Analysis Subsystem** applies complex formulas to the load data in order to generate meaningful statistics on customer, class, and system load patterns, and it produces both standard and ad hoc reports. Both subsystems include programs for various “housekeeping” tasks such as data storage.

Additional programs are included with Oracle Utilities Load Analysis system — adding further data management and analysis functions, such as advanced sample design, additional data validation, and reporting. Here is a brief description of each:

Individual Customer Analysis (ICA) — produces time-of-use, entire period and average day statistics and reports. Different time-of-use schedules can be applied to the same customer in a single run enabling what-if analysis. ICA produces statistics for interruption and load control periods, and can compute statistics for non-contiguous time periods in the same analysis.

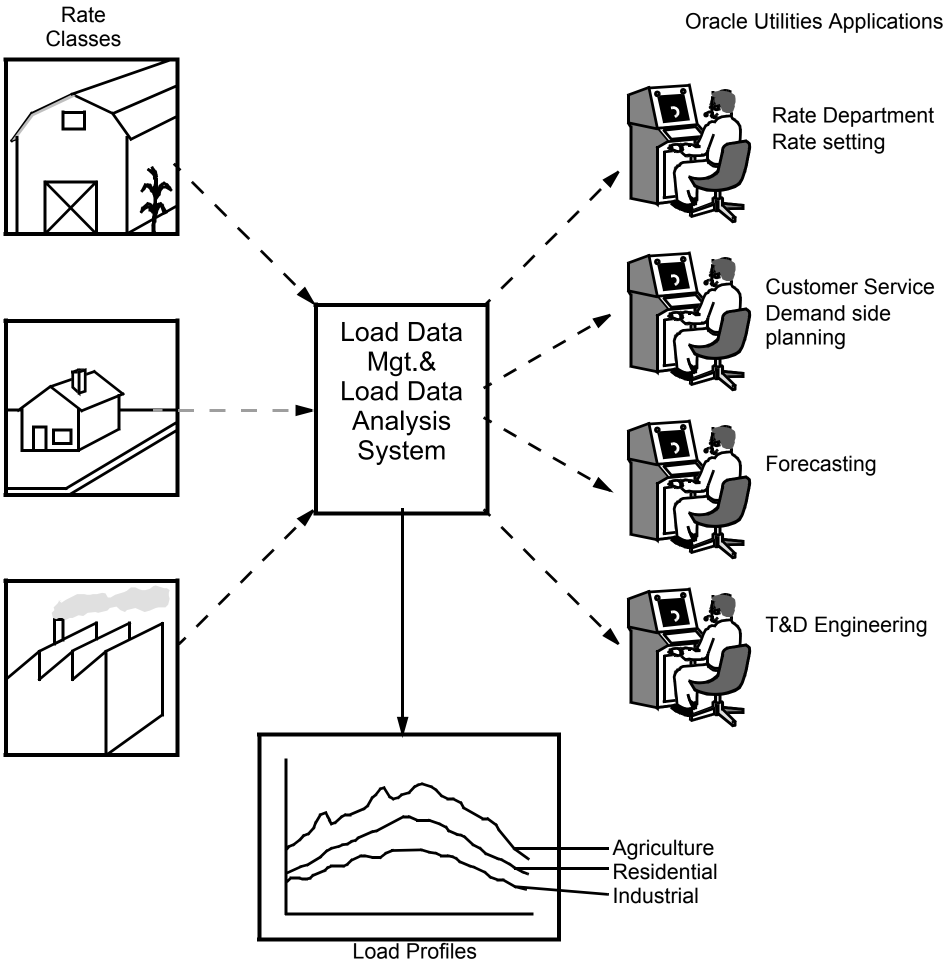


Figure 1-3 The Oracle Utilities Load Data Management and Analysis System

Oracle Utilities Load Analysis makes load data and statistics available for a variety of applications and departments in the utility.

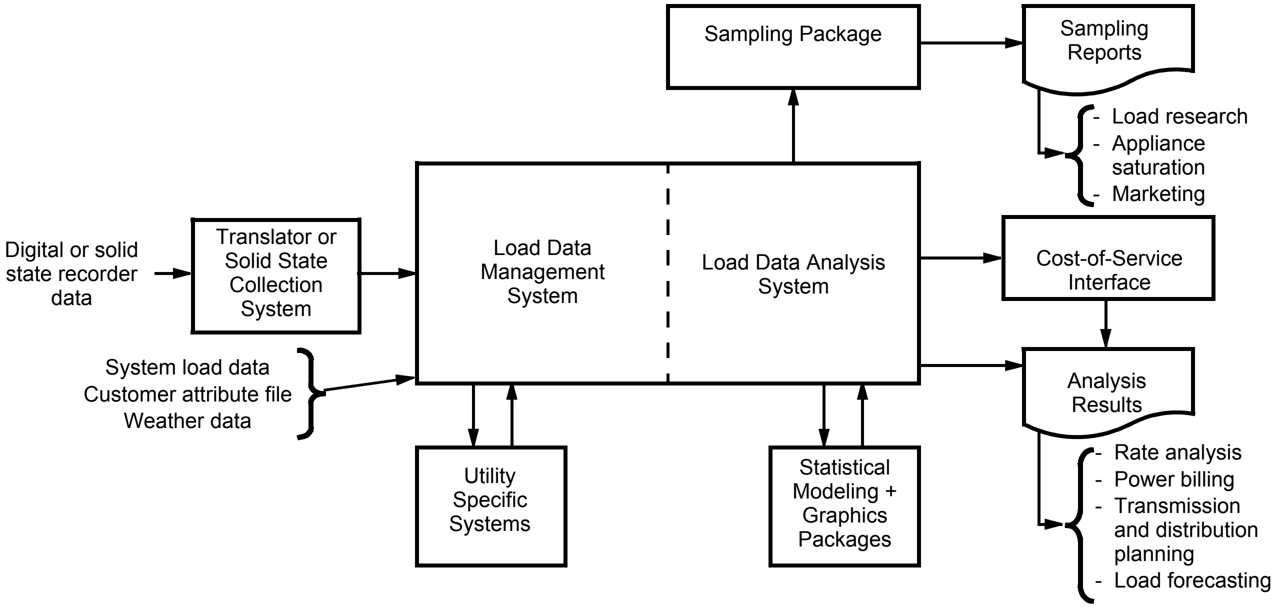

Sampling Package
Sampling Reports
- Load research
- Appliance saturation
- Marketing
Digital or solid state recorder data
Translator or Solid State Collection System
Load Data Management System
Load Data Analysis System
Cost-of-Service Interface
System load data
Customer attribute file
Weather data
Analysis Results
- Rate analysis
- Power billing
- Transmission and distribution planning
- Load forecasting
Utility Specific Systems
Statistical Modeling + Graphics Packages

Figure 1-4 Overview of the Oracle Utilities Load Data Management and Analysis System

Totalizing Reporter — reports load profile data and summary statistics on multiple channels of data. It is particularly valuable for billing and analyzing large industrial customers, cogenerators, and wholesale customers with multiple points of delivery.

Late Cut Reporter — analyzes information that has been recently entered into Oracle Utilities Load Analysis and reports any cut series that are missing their last period data.

Validation Statistics Reporter — works as an addition to the Oracle Utilities Load Analysis Load Data Input and Validation programs. It examines and reports summaries of the results of internal validation tests performed on cuts of data entered into Oracle Utilities Load Analysis.

Sampling Package — a tool for the design and selection of samples for any type of customer research, including load research and mail surveys. It supports both single- and multi-dimensional sampling, and can accommodate multiple variables (including both usage and demographics) within a single sample design. It is very useful for cost allocation, as well as marketing, forecasting, and demand planning.

Cost of Service Interface — enables electric and gas utilities to balance sample class loads to system load and accurately allocate the cost of service among rate classes, sub-classes, and special industrial customers. Using COSI, analysts can build accurate demand profiles (incorporating transmission and distribution losses as well as unexplained sampling error) for each group and then apply cost allocation formulas to develop allocation factors. The resulting factors can then be fed into the utility's cost of service software for final calculations.

Additional products are available from Oracle Utilities to maximize the value of your utility's load research programs. These products can be used in conjunction with Oracle Utilities Load Analysis or as stand-alone systems.

Oracle Utilities Rate Management — an integrated set of software tools for rate design and analysis. Its capabilities include revenue verification, rate structure creation, bill frequency analysis, typical bill analysis, customer impact analysis, crossing point analysis, and revenue adequacy analysis. It features an easy-to-use graphical user interface, relational database, and client-server architecture.

Oracle Utilities Billing Component — designed to support on-time and accurate billing for any measurable unit, (i.e. electric, gas, water, cable TV or internet bandwidth), its powerful engine handles the most complex billing scenarios in today's customer driven market. Oracle Utilities Billing Component is one of the only billing engine's flexible enough to handle diverse billing scenarios such as unbundled tariffs to cogeneration contracts. Customers use Oracle Utilities Billing Component for contractual load and special event calculations, market index, real-time pricing and products/services billing, multiple jurisdictions and suppliers, billing, online billing, EDI, multi-page bills, consolidated billing and various scheduling choices.

Oracle Utilities Load Profiling and Settlement — a cost-effective, flexible, automated, and integrated solution meeting the daily and monthly load estimating and settlement requirements resulting from Open Access. Oracle Utilities Load Profiling and Settlement currently supports multiple load profiling methods, is integrated with best-of-breed load forecasting software, provides a comprehensive load and financial settlement system, and is part of the Oracle Utilities Energy Information Platform.

Chapter 2

Overview of the Oracle Utilities Load Data Analysis System

This chapter introduces the Oracle Utilities Load Data Analysis Subsystem programs and databases, and describes the steps you will follow when working with the subsystem. If you are a new Oracle Utilities Load Analysis user, you should read this chapter.

- **What Is the Purpose of the Load Data Analysis System?**
- **How Does It Work?**
- **How Is the LAS Structured?**
- **Working With the Load Data Analysis Subsystem — What Steps Do You Follow?**

What Is the Purpose of the Load Data Analysis System?

The Oracle Utilities Load Analysis Subsystem is a comprehensive and flexible software tool that enables utility analysts to produce strata and class load estimates for any customer subset and any time period for which load data has been collected, and to aggregate class estimates to the system level (Figure 2-1: The Oracle Utilities Load Analysis Subsystem). The Load Data Analysis computes and reports detailed statistics — including total demand, standard error, level of accuracy, time-of-use and time-of-day statistics, coincident and non-coincident peak demand, total energy, and load factor.

The Load Analysis Subsystem includes the **Standard Load Analysis Program** for performing expansion, mean-per-unit and ratio estimation. With mean per unit estimation, class or strata demand is estimated by multiplying the average customer demand by the number of customers in the sample population.**Ratio Analysis** can be used to perform *ratio estimation*. Ratio estimation may produce more accurate results by incorporating billing information directly into the demand calculations; class or strata demand is estimated by multiplying the ratio of average demand to average billed energy by the total billed energy. Both Standard Load Analysis and Ratio Analysis programs handle pre- and post-stratified sampling evaluation.

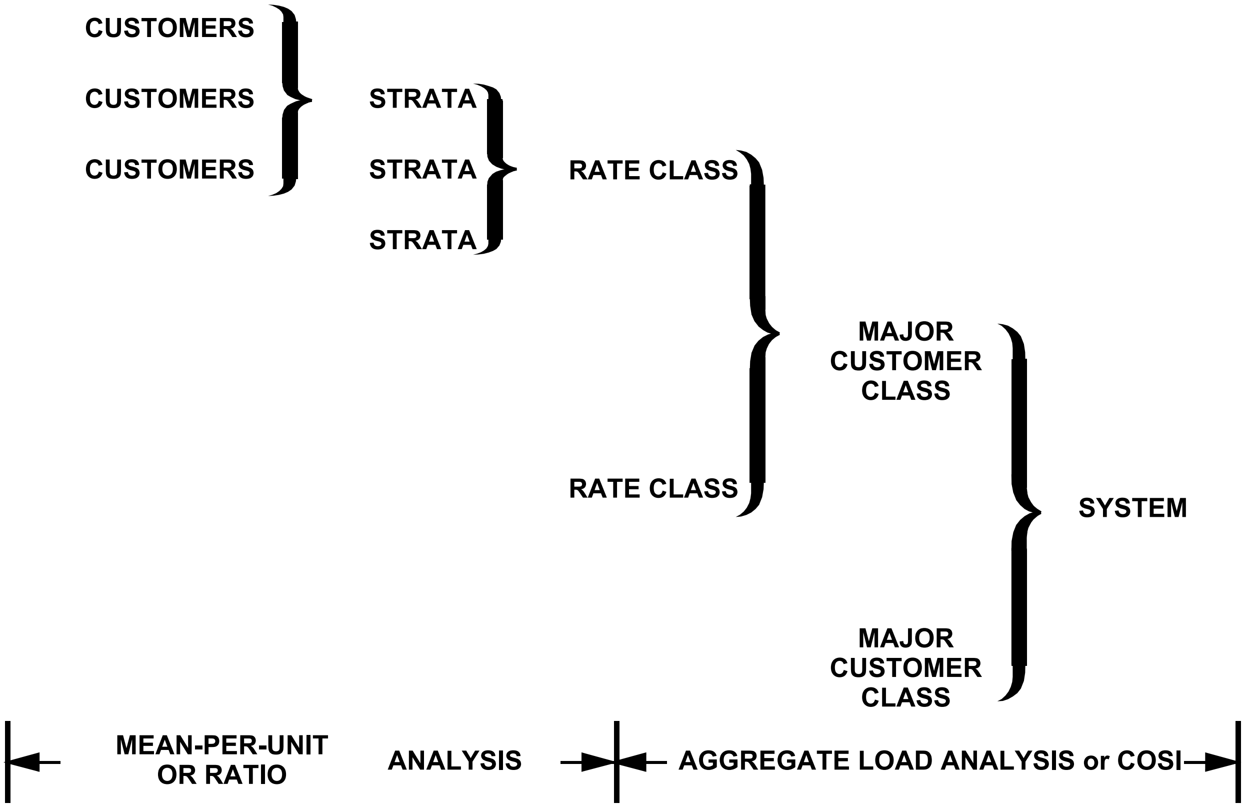


Figure 2-1 The Oracle Utilities Load Analysis Subsystem

Oracle Utilities Load Analysis enables you to raise sample data to the strata, class, and system levels.

The LAS also includes **100% Sample Analysis** for computing load statistics for 100% Sampled populations such as large industrials, and **Aggregate Analysis** and COSI for estimating loads for major customer classes or the entire system.

Ratio Analysis Program — (documented in this manual) makes it possible to estimate class demand using the ratio of sample demand to sample energy. In contrast to mean-per-unit analysis, the Ratio Analysis Program incorporates actual billing information directly into demand calculations — yielding more accurate estimates. The program produces many types of statistics and reports.

In addition, the Load Data Analysis Subsystem offers three more optional extensions that provide further analysis capabilities:

Domains Analysis — (documented in **Chapter 11**: **Estimating Loads for Subpopulations Using the Domains Analysis Programs (Y350 or Y360)**) enables analysts to produce estimates of total loads for sub-populations in an existing customer sample (for example, customers with air conditioning or grocery stores that are open twenty-four hours a day). This type of analysis is extremely useful for rate design, load management, forecasting, and marketing studies.

Coincident Peak Analysis Program — (documented in this manual) makes it possible to produce estimates of rate class coincident peak demand and its corresponding error for up to twelve periods. It helps determine the responsibility of a rate class towards cost, providing a more accurate measure than approaches based on a single hour of demand. Coincident Peak Analysis uses both mean-per-unit and ratio estimation techniques.

Oracle Utilities Load Analysis also makes individual customer statistics and group statistics available for ad hoc analysis, either by the Oracle Utilities Load Analysis Transformation Program or by external programs such as spreadsheet packages and statistical analysis packages.

Altogether, the Load Data Analysis Subsystem is both powerful and flexible, giving you many options in terms of data selection, analysis methodologies and parameters, and reporting capabilities. These features simplify and streamline sensitivity analysis, and enable you to quickly and efficiently respond to requests for different types of analyses.

How Does It Work?

The Load Data Analysis Subsystem accepts interval load data from the Load Data Management Subsystem or other sources. ("Interval load data" refers to a series of values representing each individual customer's demand, measured at regular, short time intervals.) You can select data for analysis by specifying the date range, customer subset, and criteria for acceptable data quality.

According to parameters you supply, Oracle Utilities Load Analysis first develops strata and class statistics by combining and analyzing customer load data (Figure 2-2: Developing Strata and Class Statistics from Customer Load Data.), interval by interval over the entire analysis period. The resulting statistics are called *Entire Period Demands*.

At the strata level, these statistics are estimates of total demand and the standard error — for each interval in the analysis period. Oracle Utilities Load Analysis combines the strata estimates to obtain class-level estimates of total demand, standard error, precision, and degrees of freedom — also interval by interval over the entire period.

In addition to statistics for the entire period, Oracle Utilities Load Analysis looks at the interval load data in different ways to calculate two other types of statistics called *Average Day* and *Time-of-Use Statistics*.

Average Day Statistics are computed from customer load data across a set of like days. For example, to estimate how a class uses electricity on Saturdays (e.g., "average Saturday"), Oracle Utilities Load Analysis looks at each interval of every Saturday for each customer in the class. You can even define your own set of “like days” to be averaged together using the User-Specified Day File (for example, summer peak days over several years).

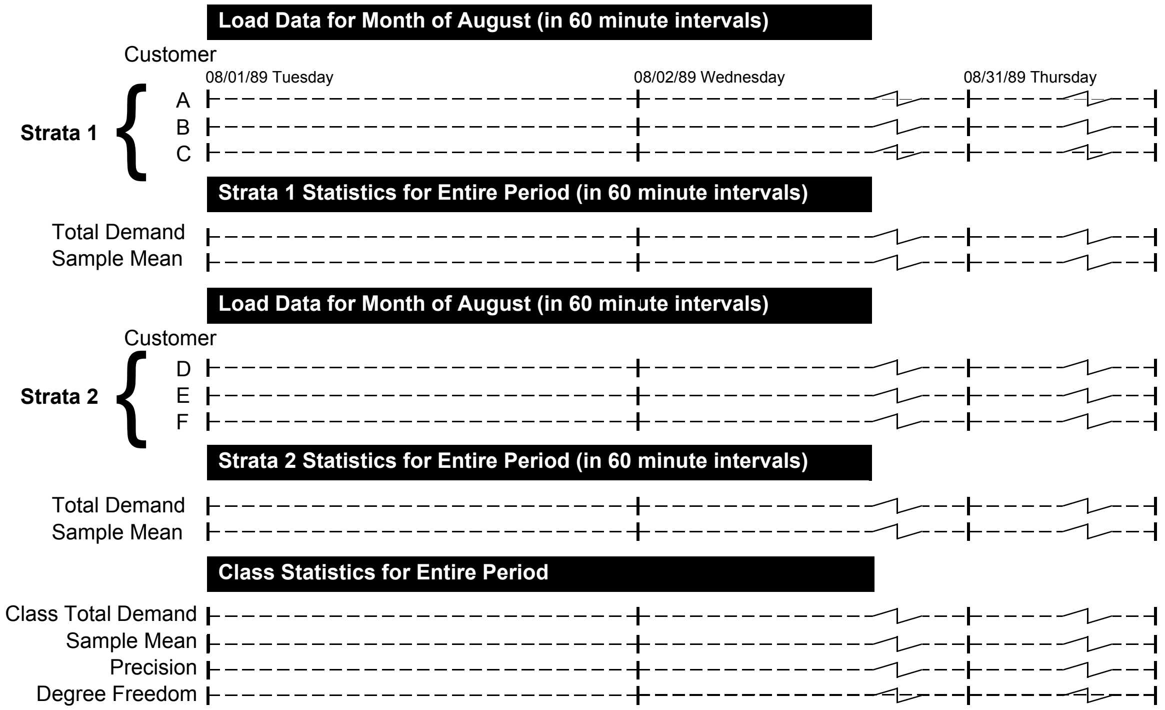

Load Data for Month of August (in 60 minute intervals)
Customer
08/01/89 Tuesday
08/02/89 Wednesday
08/31/89 Thursday
Strata 1
A
B
C
Strata 1 Statistics for Entire Period (in 60 minute intervals)
Total Demand
Sample Mean
Load Data for Month of August (in 60 minute intervals)
Customer
Strata 2
D
E
F
Strata 2 Statistics for Entire Period (in 60 minute intervals)
Total Demand
Sample Mean
Class Statistics for Entire Period
Class Total Demand
Sample Mean
Precision
Degree Freedom

Figure 2-2 Developing Strata and Class Statistics from Customer Load Data.

This diagram illustrates how Oracle Utilities Load Analysis develops statistics for an entire period from customer load data. Here the entire period is the month of August. It consists of 31 days of hourly data — for a total of 744 intervals per customer. Oracle Utilities Load Analysis looks at the values for each customer in the strata, interval by interval, to develop strata statistics. It then looks at the values for each strata, interval by interval, to develop class statistics.

Time-of-Use Statistics include estimates of demand, energy, and load factor for the strata, class, and samples — computed for user-defined blocks of time.

Oracle Utilities Load Analysis also produces a file of *Individual Customer Statistics*. For each customer, Oracle Utilities Load Analysis computes the customer’s total energy use and maximum demand for the period, demand at the time of class peak, load and diversity factors, as well as other statistics.

The following tables summarize the statistics computed by the Oracle Utilities Load Analysis Standard Load (mean-per-unit) Analysis, Ratio Analysis, 100% Sample Analysis, Aggregate Analysis, Coincident Peak Analysis, and Domains Analysis programs. The actual formulas that Oracle Utilities Load Analysis uses to compute these statistics are reproduced in the appendices.

Statistics Computed by the Standard Load Analysis Program

Strata/Class Statistics

Entire Period Demands	Total demand Average demand Standard error Load duration T-Statistic	Relative precision Degrees of freedom Sample size # observations Observed biases
Average Day Demands Average day Average day, excluding holidays Average weekday Average weekday, excluding holidays Average weekend Average weekend, excluding holidays Average Sunday Average Monday Average Tuesday Average Wednesday Average Thursday Average Friday Average Saturday Average weekday holiday Average weekend holiday Average holiday or weekend Average User-Specified Days Day of class peak Day of class peak/Time of use period Day of class minimum Day of class minimum/Time of use period Day of supplied peak(s)	Class total demand Total demand Average demand Relative error	
Time-of-Use Statistics Maximum coincident demands Minimum coincident demands Noncoincident demands Energy (prorated) Load factors based on maximum coincident demands Load factors based on noncoincident demands Diversity factors Coincidence factors	Total demand Average demand Standard error Relative precision (class only) Degrees of freedom (class only) Sample size	
Standard Deviation of Sample Residuals of Demand	Standard Deviation of Residuals Sample Size	
Individual Customer Statistics Energy Maximum coincident demands Noncoincident demand Load factors based on maximum coincident demands Load factors based on noncoincident demands Diversity factors Coincidence factors		

Statistics Computed by the Ratio Analysis Program (Non-stratified Ratio and Stratified Combined)

Entire Period Demands	Total demand Average demand Standard error Relative precision Sample size
Average Day Demands Average day Average day, excluding holidays Average weekday Average weekday, excluding holidays Average weekend Average weekend, excluding holidays Average Sunday Average Monday Average Tuesday Average Wednesday Average Thursday Average Friday Average Saturday Average weekday holiday Average weekend holiday Average holiday or weekend Average User-Specified Day Day of class peak Day of class peak/Time of use period Day of class minimum Day of class minimum/Time of use period Day of supplied peak(s)	Total demand Average demand Relative error Sample size
Time-of-Use Statistics Maximum coincident demands Minimum coincident demands Noncoincident demands Energy (prorated) Load factors based on maximum coincident demands Load factors based on noncoincident demands Diversity factors Coincidence factors	Total demand Average demand Standard error Relative precision Sample size
Standard Deviation of Sample Residuals of Demand	Standard Deviation of Residuals Sample Size
Individual Customer Statistics Energy Maximum coincident demands Noncoincident demands Load factors based on maximum coincident demands Load factors based on noncoincident demands Diversity factors Coincidence factors	

Statistics Computed by the Ratio Analysis Program (Stratified Separate)

Strata/Class Statistics

Entire Period Demands	Total demand Average demand Standard error Relative precision 10% T-Statistic Degrees of Freedom Correlation (Strata only) Sample size
Average Day Demands Average day Average day, excluding holidays Average weekday Average weekday, excluding holidays Average weekend Average weekend, excluding holidays Average Sunday Average Monday Average Tuesday Average Wednesday Average Thursday Average Friday Average Saturday Average weekday holiday Average weekend holiday Average holiday or weekend Average User-Specified Day Day of class peak Day of class peak/Time of use period Day of class minimum Day of class minimum/Time of use period Day of supplied peak(s)	Total demand Average demand Relative error Correlation (Strata only) Sample size
Time-of-Use Statistics Maximum coincident demands Minimum coincident demands Noncoincident demands Energy (prorated) Load factors based on maximum coincident demands Load factors based on noncoincident demands Diversity factors Coincidence factors	Total demand Average demand Standard error Relative precision 10% T-Statistic Degrees of Freedom Sample size
Standard Deviation of Sample Residuals of Demand	Standard Deviation of Residuals Sample Size
Individual Customer Statistics Energy Maximum coincident demands Noncoincident demands Load factors based on maximum coincident demands Load factors based on noncoincident demands Diversity factors	

Statistics Computed by the Aggregate Analysis Program

Entire Period Demands	Total demand Average demand Standard error Relative precision 10% T-Statistic Degrees of freedom Sample size
Average Day Demands Average day Average day, excluding holidays Average weekday Average weekday, excluding holidays Average weekend Average weekend, excluding holidays Average Sunday Average Monday Average Tuesday Average Wednesday Average Thursday Average Friday Average Saturday	Total demand Average demand Relative error Sample size
Average weekday holiday Average weekend holiday Average holiday or weekend Average User-Specified Day Day of group peak Day of group peak/Time of use period	Total demand Average demand Relative error Sample size 10% T-Statistic Degrees of freedom
Time-of-Use Statistics Noncoincident demands Energy (prorated) Factor Reports only show Average Demand Size Load factors based on maximum coincident demands Load factors based on noncoincident demands Diversity factors Coincidence factors	Total demand Average demand Standard error Relative precision 10% T-Statistic Degrees of freedom Sample size

How Is the LAS Structured?

The Load Data Analysis Subsystem consists of a group of programs and databases designed to enable you to input, edit, analyze, store, and report load data and statistics (see Figure 2-3: Structure of the Load Data Analysis Subsystem).

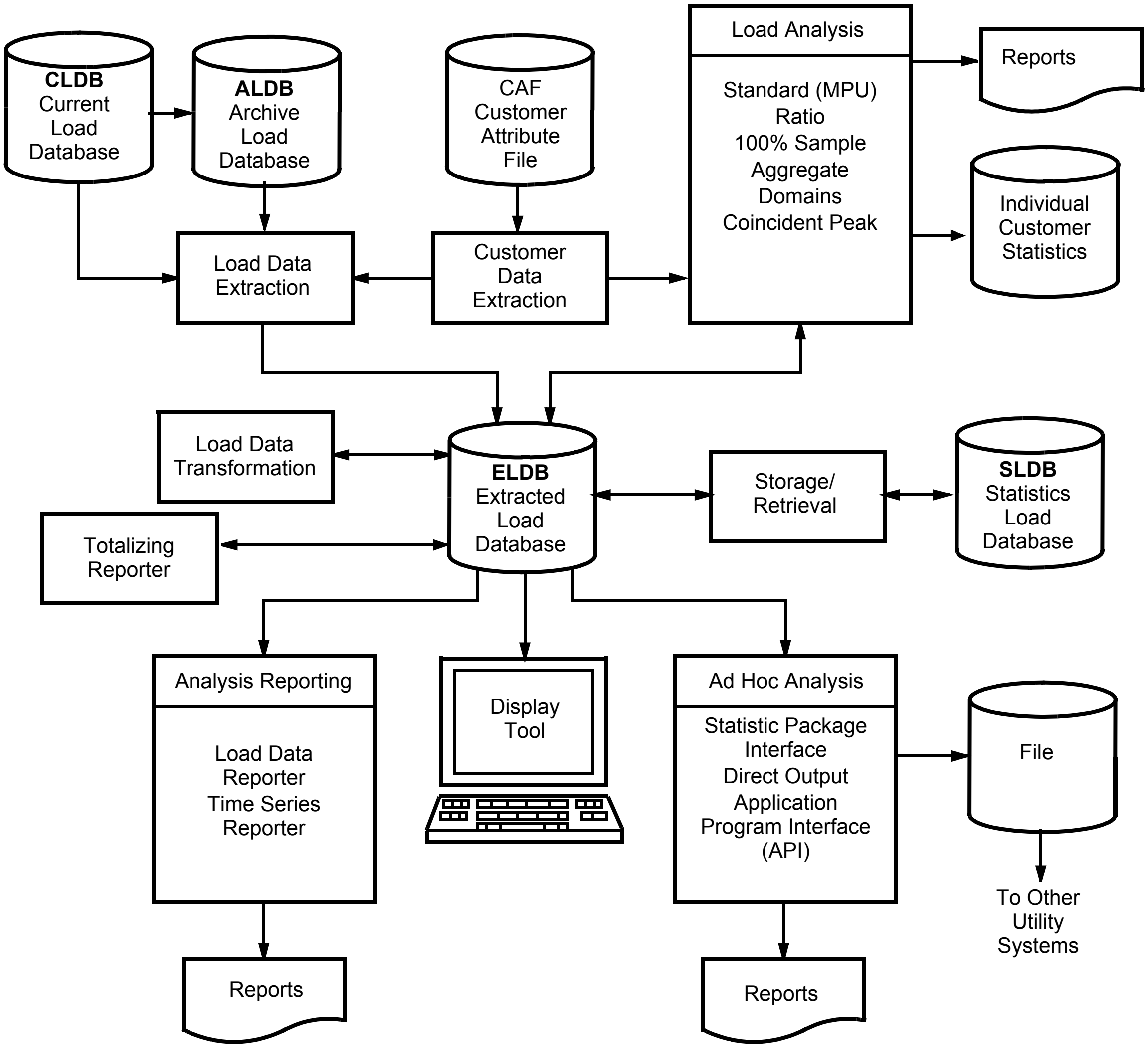


Figure 2-3 Structure of the Load Data Analysis Subsystem

The LAS incorporates three databases:

- **Extracted Load Database (ELDB)** — the on-line, working database for the Load Analysis Subsystem. This is where you put data in order to analyze it.
- **Statistics Load Database (SLDB)** — the optional, off-line storage for selected results generated by the LAS (load data, analysis statistics, transformed load data, etc.)
- **Customer Attribute File (CAF)** — a user-defined file of information about each customer. It can include any type of information important to your utility, but typically includes name, address, geographic region, SIC codes, billing information, major customer class, rate class, and stratification number (or cell) from original sample. This file makes it possible to analyze sub-groups of customers that share specified criteria.

The LAS extracts data for analysis from two databases in the Load Data Management Subsystem:

- **Archive Load Database (ALDB)** — the optional, off-line storage for data that has been validated with the Load Data Management Subsystem. The ALDB is typically the source of data for analysis.
- **Current Load Database (CLDB)** — the on-line, working database for the Load Data Management Subsystem. Data in the CLDB has been converted to the standard Oracle Utilities Load Analysis load data format, but may or may not have been validated for analysis. The CLDB is an alternate source of data for analysis.

The LAS also includes several programs. Their uses are described on the following page.

Working With the Load Data Analysis Subsystem — What Steps Do You Follow?

The Load Data Analysis Subsystem is very flexible, allowing you to tailor its applications to the particular needs of your utility. As an introduction, the basic sequence of steps for using it are outlined below. Following chapters will examine each operation — along with its many options — in detail.

Step 1: Inputting Data

The first step is to bring selected data into the Extracted Load Database (ELDB), where you can apply the Oracle Utilities Load Analysis analysis programs to it. You can use the *Load Data Extraction Program* (Y240) to extract it from the Archive Load Database (ALDB) or the Current Load Database (CLDB), or you can enter it manually using the *Manual Entry Program* (Y220). Obviously, the quality of an analysis is dependent upon the quality of the sample data, so you will want to be sure that the data you enter is as complete and accurate as possible.

If you wish to analyze only data for customers who fit a particular profile, you can use the *Customer Data Extraction Function* (Y110) — a.k.a. the Key Generator — to extract customer data according to the specific criteria you want.

Step 2: Modifying Data

Under certain circumstances, you may wish to modify data in the ELDB before analysis. For example, if you were to run analyses for planning purposes, you would probably replace outages with estimated values. (Although the outages reflect actual customer usage, they are likely to be the results of abnormal events of a particular past period and are not appropriate to include in forecasts of use.) In such a case, you would first review the data in the ELDB using the *Load Data Reporter (ELDB) Program* (Y420), the *Display Tool*, or IDM. Once you have identified the data you wish to modify, you would use the *Load Data Editor (ELDB) Program* (Y630) or IDM.

Step 3: Analysis — Expanding Data to Class Level Estimates

Once the interval data is in the ELDB, you can apply either the *Standard Load Analysis Program* (Y310) (for Mean Per Unit analysis) or the *Ratio Analysis Program* (Y330) to it. These programs calculate statistics for single analysis groups such as strata or rate classes. The *100% Sample Analysis Program* (Y380) is also available to calculate statistics for 100% sampled populations, such as large industrials.

Whether you use Standard Load Analysis or Ratio Analysis, your choice of program will depend upon your objectives, whether or not billed energy data is available, and possibly your sample design and quality. This data may come from books and records, or you may use the *Billed Energy Program* (Y230) to derive the values from interval demand data in a Oracle Utilities Load Analysis database.

Both the Standard Load and Ratio Analysis programs perform stratified or non-stratified analysis and provide both pre- and post-stratification capability. The Ratio Analysis program offers two estimation techniques for stratified samples — Combined Estimate and Separate Estimate.

In addition, both Standard Load Analysis and Ratio Analysis compute and report an extensive variety of load statistics, including estimates of load profiles, energy, and relative precision. The programs write all calculated statistics as cuts to the ELDB for additional analysis and reporting. They also create a file of individual customer statistics that can be accessed by user programs.

> **Note:** If you wish to analyze only customers who fit a particular profile, you can use the *Customer Data Extraction Function* to select a subset of data in the ELDB for analysis.

Step 4: Analysis — Aggregating Class Estimates to the System Level

The *Aggregate Load Analysis Program* (Y320) or the COSI subsystem enable you to combine the results of your analyses for individual analysis groups to obtain statistics for a major customer class or the entire system. The program can process data from multiple sources (e.g., Standard Load Analysis, Separate Ratio Analysis, Combined Ratio Analysis, and 100% Sample Analysis) in a single run. Again, you can report any or all of the resulting statistics, and save them in the ELDB for additional analysis and reporting.

Step 5: Reporting

Once you have created a body of statistics using the Oracle UtilitiesOracle Utilities Load Analysis Analysis programs, you may want to produce special reports that highlight some subset of the results or provide additional information. Many different reporting programs are available. For example, the *Time Series Reporter* (Y410) is a useful tool for formatting reports of user-selected statistics in a neat, tabular format. The *ELDB Summary Reporter* gives a quick overview of the entire contents of the database, listing each record in the database along with its start time and percentage of acceptable data. The *Load Data Reporter (ELDB) Program* (Y420) enables you to take a comprehensive, detailed look at each statistic or load data record. The *Display Tool* enables you to quickly display load data and statistics in easy-to-understand graphs.

Step 6: Additional Analysis

In addition to the standard analysis programs described above, Oracle Utilities Load Analysis supports ad hoc analysis.

Oracle Utilities Load Analysis also offers a *Load Data Transformation* (Y620) capability. Data Transformation enables you to create new data from existing data in the Extracted Load Database (ELDB) or Current Load Database (CLDB). For example, you can compute a customer’s power factor from KVA and KW. Load data transformations include standard arithmetic operations and functional operations.

Optional extensions are available to further enhance the analysis capabilities of your Oracle Utilities Load Analysis system. Some or all of these extensions may be in use at your facility. They include: *Domains Analysis* (Y350, Y360) for computing statistically-reliable estimates for subgroups in preexisting samples; *Coincident Peak Analysis* (Y340) for calculating the estimate of the mean and corresponding sampling error for up to twelve periods of coincident peak demands and *Totalizing Reporter* (Y450) for reporting load profile data and summary statistics on multiple channels of data. Coincident Peak Analysis is documented in this manual. The others are documented in separate manuals. Contact your supervisor or Oracle Corporation for more information.

Step 7: Archiving Statistics and Load Data

Oracle Utilities Load Analysis gives you the option of archiving your statistics and load data to archive designated databases. Use the *Archive/Delete Program* (Y910) to move specified records from the Extracted Load Database to the Statistics Load Database (SLDB). The *SLDB Key Generator Program* (Y820) facilitates the process by enabling you to quickly specify records for archiving according to desired criteria.

Prior to moving data from the ELDB to the SLDB, you may want to examine the contents of the ELDB. The *ELDB Summary Reporter* (Y440) enables you to produce a hard copy list of the entire contents of the ELDB as well as useful statistics on the database (number of cuts, number of statistics, etc.).

Once records have been archived to the SLDB, you may find that you need to move them back to the ELDB for further analysis or examination. The *SLDB Retrieval Program* (Y960) makes this possible. The SLDB can be directly accessed from most Oracle Utilities Load Analysis programs.

Chapter 3

The Oracle Utilities Load Analysis Data Formats

In previous chapters we have often used the term “load data” to refer to the raw data that Oracle Utilities Load Analysis analyzes in order to generate statistics. In this chapter we will take a closer look at the kinds of information Oracle Utilities Load Analysis handles and how it is organized in the analysis subsystem. We will examine the formats for both load data and statistics.

This is a key chapter, and new Oracle Utilities Load Analysis users should be sure to read it. It defines many of the terms you will need to understand as you work with the Load Analysis Subsystem, including:

- **ELDB Load Data Records**
- **Statistics Records**

The Oracle Utilities Load Analysis Subsystem stores and manipulates two major types of data:

- **Load Data** — also called "time-series data" — finite sequences of discrete measurements of various quantities such as electric loads, voltage, temperature, and other variables that fluctuate over time. The terms "load data" and "interval data" are used throughout this discussion in a generic sense to cover all time-series data.
- **Statistics** — estimates of demand for various groups (customers, strata, samples, classes, and system) computed by the Load Analysis Subsystem.

This chapter examines the content and organization of both types of records in detail.

> The Load Analysis Subsystem also uses a user-created Customer Attribute File to describe the characteristics of sampled customers. That file is described in *Chapter 14*: *Key Generators — Shortcuts for Creating Input Files and Reports*.

ELDB Load Data Records

Cuts, Cut Series, and Cut Keys

Oracle Utilities Load Analysis works with load data in units called "cuts" and "cut series" (Figure 3-1: Cuts and Cut Series).

- **Cut** — A cut is a record of load data for a single customer and channel number, covering a single, user-defined time period. Each cut has a unique start-time and stop-time. (Cuts are so named because they represent a slice of time in the ongoing measurement of a customer's demand.)

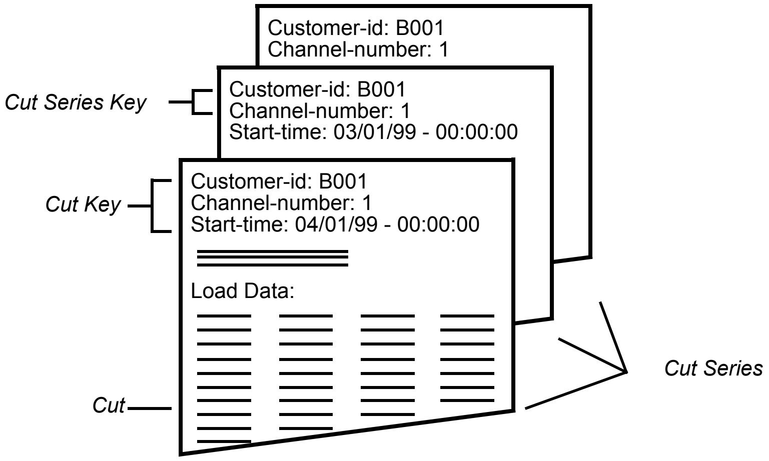


Figure 3-1 Cuts and Cut Series

A cut is a record for a single customer and channel number for a specified time period. A cut series is a collection of cuts for a single customer/channel number over several consecutive time periods.

- **Cut Series** — A cut series is a collection of cuts for a single customer and channel number, covering a number of consecutive time periods.

"Cut Keys" and "Cut Series Keys" are the identifiers for the Oracle Utilities Load Analysis load data records. You will often use these keys when working with Oracle Utilities Load Analysis — to retrieve cuts or create input files, for example.

- **Cut Key** — A cut key is a unique identifier for a specific cut. It always consists of the cut's "customer-id," "channel-number," and "start-time." For example, the cut key for customer B001, channel 1, with a start-time of July 1, 1999 at 00:00:00 would be:

  ```
  B001, 1, 07/01/99-00:00:00
  ```

  Note: When entering the cut key, you *must* input customer-id, channel-number, and start-time *in that order*, and you *must* insert a comma and/or blank space between the elements.

- **Cut Series Key** — The identifier for a cut series is called the cut series key, and consists of the "customer-id" and "channel-number". For example, the cut series key:

  B001, 1

would identify *all* cuts in the database with the customer-id “B001” and channel 1, regardless of their start-times.

Note on the differences between cuts in the Load Data Analysis Subsystem and the Load Data Management Subsystem:

In the Load Data Management Subsystem (Current Load Database and Archive Load Database), the length of time spanned by a cut depends upon how the data was recorded, and can vary from cut to cut. The cut’s start-time is the beginning of the recording period, and its stop-time is the end of the recording period.

In the Load Data Analysis Subsystem, on the other hand, the time period spanned by a cut is defined by the Oracle Utilities Load Analysis user when he or she extracts the cut from either the Current Load Database or the Archive Load Database for input to the Extracted Load Database. The cut must cover a calendar period made up of whole day increments; e.g., day(s), week(s), month(s), or one year. The recommended time period is one month.

With Client/Server Oracle Utilities Load Analysis, there is no maximum cut size. Oracle Utilities Load Analysis can handle up to 3600 intervals in a single cut.

In addition, cuts in the ELDB do not store meter readings, validation flags, or archive flags (these fields are automatically set to zero).

Header and Interval Data in Load Data Records

A Oracle Utilities Load Analysis cut consists of two parts:

- **Header** — a series of fixed-length fields that contain the cut key and other descriptive information about the cut.
- **Interval Data** — a series of values that represent the actual customer demand, measured at specified intervals. This data is stored as “energy,” but can be reported as “energy” or “demand.” The interval data portion of the cut can be any length when using Client/Server Oracle Utilities Load Analysis.

  Oracle Utilities Load Analysis also stores status codes in this portion of the record. Status codes indicate the quality of the load data, interval by interval.

Each field in the record is described in detail below and on the following pages. The fields are described in the order in which they appear on the report, and are pertinent to the Oracle Utilities Standard Format (.INP), although Oracle Utilities Load Analysis supports the .LSE format also.

- **Customer-id** is a unique 1- to 64-character identifier assigned to each customer or recording device by rate analysts or others at your utility.

  Typically, the ID is assigned to the recording device when it is installed, and Oracle Utilities Load Analysis automatically preserves the ID with the cut. However, Oracle Utilities Load Analysis gives you the option of modifying the ID when the data is input to the Current Load Database.
- **Channel-number** is an integer (0 to 32767) used to identify the port, register, or channel of the device used to record load data for a customer. Different channel-numbers are often assigned to specific end uses, such as water heaters, etc. As with customer-ids, the channel-numbers are usually assigned when the device is installed, but it is also possible to change the numbers when data is input to the Current Load Database.
- **Start- and Stop-Times** define the beginning and end of the time period spanned by the cut. The standard format for expressing start- and stop-times is:

mm/dd/yy-hh:mm:ss

where mm = month, 01 ≤ mm ≤ 12

dd = day, 01 ≤ dd ≤ the number of days in the respective month

yy = year, (19)70 ≤ yy ≤ (20)55

hh = hour, 00 ≤ hh ≤ 23

mm = minute, 00 ≤ mm ≤ 59

ss = second, 00 ≤ ss ≤ 59

In some cases, the format mmddyyhhmmss may also be used.

> **Note:** Because data in the Extracted Load Database is created by extracting whole day increments, the hours/minutes/seconds in start-times are always 00:00:00, and in stop-times are always 23:59:59.

- **Descriptor** is an 80-character, user-defined field. Typically, it is used to store customer name, address, and account. Oracle Utilities Load Analysis can split the field to allow queries on specific information.

  > **Note:** The descriptor of a cut exist in the output file for each cut of a file.

- **Time Span** is the time period covered by the cut, and the number of intervals in the cut. These fields are automatically computed by Oracle Utilities Load Analysis. In the ELDB, the number of expected and recorded intervals will always match.
- **Seconds-per-Interval** is the length of each interval. You can specify this value when extracting data from the Current Load Database or the Archive Load Database. Note, however, that you can specify only the same or a greater value than the original value. For example, if the data was recorded at 900-second intervals, you can extract it at 3600-second intervals and Oracle Utilities Load Analysis will automatically combine the values. It is not possible to break the 900-second intervals into 300 seconds, however. Keep in mind also that intervals may be *summed* or *averaged* when aggregated to a lower frequency, depending upon the unit of measure for the data. The aggregation technique used by Oracle Utilities Load Analysis for each UOM is noted in *Appendix J: Oracle Utilities Unit of Measure Codes*.
- **Meter Data** is not used in the Extracted Load Database. The fields are automatically set to zero.
- **UOM** stands for “Unit of Measure” and identifies the type of interval data stored in the cut. In some instances you may be required to specify UOM using a 3-digit Oracle Utilities code. For example, “01” means that load data is stored as kilowatt-hours. A complete list of the standard codes used in the Oracle Utilities Load Analysis system is provided in *Appendix J: Oracle Utilities Unit of Measure Codes*.
- **Pulse Multiplier and Pulse Offset** are values used to convert pulse counts in a Oracle Utilities Load Analysis .INP file into real measurements, such as kilowatt hours. The pulse multiplier is a scale factor, and the pulse offset is a displacement. The values can be different for each customer-id/channel-number. These values are stored for reference only, provided a cut was created from an .INP file containing them. Zeros in both of these values indicates that they were not used in creating the cut, which may have been created using the .LSE or other input format.
- **Energy** is the total amount of energy used by the customer during the time period spanned by the cut. Oracle Utilities Load Analysis calculates this value as Σ (interval data values).
- **Validation Messages** are not used for load data records in the Extracted Load Database. The messages are automatically set to blank.
- **Edit Trails** are not used for cuts in the Extracted Load Database.

- **Interval Data** is a series of values that represent load data or other measurements taken at specific intervals. Oracle Utilities Load Analysis can report this data as "energy" or "demand."

  Note; In Oracle Utilities Load Analysis, there is no such cut start- or stop-time of 24:00:00

  Except for the intervals containing the start- and stop-times, each interval within a series is referenced by a date/time that *ends one second before a whole interval boundary*; i.e., a time evenly divisible by the interval length expressed in seconds-per-interval. For example, :15, :30, :45, and :00 are whole interval boundaries for 15-minute data. All times not on a whole interval boundary will be rounded up to the next highest boundary; i.e., for 5-minute data, the time 09:51 will become 09:55.

  Oracle Utilities Load Analysis handles *daylight savings time* by storing data on a local time basis. The load data for the spring DST day is assumed to span 23 whole hours; before evaluation, an extra hour of missing data (zeros with a status code of 'q') is inserted after the interval ending at 1:59:59 a.m. on the day of the spring DST change. The load data for the fall DST day is assumed to span 25 hours; before evaluation, similar intervals during the hours ending at 1:59:59 a.m. and 2:59:59 a.m. on the last Sunday in October are averaged together (e.g., for 15-minute data, the intervals ending at 2:14:59 and 3:14:59 are averaged, 2:29:59 and 3:29:59 are averaged, etc.). Adjustments are automatically made to ensure the proper evaluation of data that spans a daylight savings time boundary. In summary, the ELDB stores raw data observing DST, and writes/calculates statistics after a 24 hourization conversion takes place.

- **Status Codes** indicate the quality of the load data. There is one status code for each interval (see Figure 3-2: Oracle Utilities Status Codes).

  The collection of load data is prone to different problems — for example, human error, power outages, timing channel malfunctions, etc. Some of the resulting data errors are more serious than others. For example, a power outage can be corrected by inserting zero data values for the affected intervals, but missing data is more difficult to correct. It is important during load analysis and other activities that the reliability of the data is known. In some situations, the omission of questionable data may produce too small a sample to obtain meaningful results, while its inclusion may lead to erroneous results. It is also necessary to make a distinction between zero usage and missing values, and between estimated data and data that has been explicitly corrected using information from an alternate source.

Status Code	Classification of Interval Data
' '	Normal
'A'	Normal, alternate-recorded (e.g., hand-entered)
'J'	Data inserted by Oracle Utilities Load Analysis to correct outage
'L'	Default for data modified by Load Data Editor
'N'	Interruptible or curtailable load
'P'	Inserted outage
'Q'	Corrected outage
'X'	Cuts resulting from merging invalid data or from unrecognized status codes
'Y'	Reserved

Status Code	Classification of Interval Data
‘1’	Uncorrected outage (also called loss of potential)
‘2’	Non-normal (usually timing-pulse defects)
‘5’	Aggregated interval used in rolling format with partially missing or unavailable data
‘7’	Aggregated or transformed interval with partially missing data
‘9’	Missing

Figure 3-2 Oracle Utilities Status Codes

The recording devices themselves assign status codes to the data. However, each device manufacturer uses a different set of conventions. Oracle Utilities Load Analysis automatically translates these codes to a consistent standard during the data input process. Status codes are also assigned to edited data. Figure 3-2: Oracle Utilities Status Codes provides a list of the Oracle Utilities codes, arranged in order of increasing uncertainty.

> **Note:** Alpha codes generally indicate that the data is acceptable; numeric codes indicate that the data is suspect and requires correction.

The manufacturer’s codes are translated to Oracle Utilities status codes during Load Data Input. This translation is designed to be as consistent as possible among various manufacturers. Data that is altered during Load Data Editing is assigned a different code, depending upon what was done to it. For example, normally-recorded, unedited data is assigned a blank status code (‘ ’), which is the best quality code on the list. Inserted data is assigned a ‘poorer’ status code (‘J’) but ranks above patched data (‘L’). The boundary between two successive recording periods in a series is a potential trouble spot. If the value exceeds either of the surrounding values, it is called a *splice peak* and is given an estimated value equal to the average of the surrounding values and a status code of ‘M’. When using a rolling format, data aggregated from partially missing data or unavailable data is assigned a status code of ‘5**’**. Data aggregated or transformed from partially missing data is assigned a status code of ‘7’. Missing data carries the worst code of all (‘9’), and is therefore distinguishable from actual zero usage. Only numeric status codes (‘1’ - ‘9’) are flagged during the validation process.

The status codes enable you to specify the range of acceptable data quality for analysis. For example, you could run an analysis on only data that has status codes of ‘ ’ through ‘L’. You can also perform a sensitivity analysis by specifying a different range and re-running the analysis.

> **Note:** Your utility may have a unique set of status codes. The box below is provided for you to list the unique status codes used at your facility:

Status Code	Classification of Interval Data

Status Code	Classification of Interval Data

Record Types and Flags

On records or reports, you may notice fields marked “Internally Valid”, “Externally Valid”, “Merge,” “Archive”, and “Edit”. Oracle Utilities Load Analysis sets these fields automatically and uses them to manage the progress of a cut through the data input, validation, and editing processes in the CLDB and ALDB. They will not affect your work with the analysis subsystem *except* when you extract data from the ALDB or the CLDB. (See the chapter on extracting data later in this manual.) On cuts in the ELDB, Oracle Utilities Load Analysis automatically sets the External Validation flags to Y (Yes), and the Edit, Archive, and Merge flags to N (No). Only “Active” type records are stored in the ELDB. There is no audit trail in the ELDB.

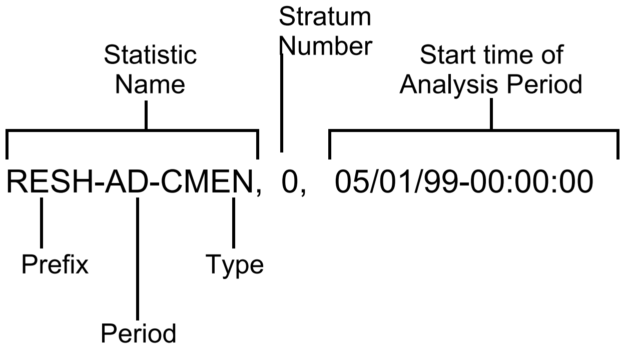
Statistics Records

Most often, you will view statistics in the formatted reports produced at the end of the analysis runs. Occasionally, however, you may want to see more detailed information about individual statistics, such as strata population and weight. This section provides a complete list and explanation of all of the data fields contained in an ELDB statistics record.

You will see that statistics records share the same format as load data records. That is why a statistics record is sometimes referred to as a “cut.” However, there are differences in the types of data stored.

Statistics Identifiers

Each statistic computed by the Load Analysis Subsystem is identified by a unique key (similar to the Cut Key). These keys are meaningful codes that contain a great deal of information about the statistic. Each key consists of three elements: “statistic name,” “stratum number,” and “start-time.” Because statistics are stored in the same format as load data records, these three elements are sometimes referred to by the positions they share with the cut key: “customer-id,” “channel-number,” and “start-time.”


Stratum Number
Statistic Name
Start time of Analysis Period
RESH-AD-CMEN, 0, 05/01/99-00:00:00
Prefix
Type
Period

- **Statistics Name** is made up of three parts:

  Prefix — a unique 4- to 6-character identifier that you assign before running the analysis program; used to identify the group (and possibly TOU period). Any combination of characters (A - Z) and digits (0 - 9) may be used, but special characters (not a letter or number) are *not* allowed.

Period — in most cases, this indicates the time period represented by the statistic — such as “average weekday”, “average Friday”, or “day of class peak demand”. This field is automatically filled in by the Oracle Utilities Load Analysis program, using a 2- to 5-character code (which is reproduced in the *Oracle Utilities Load Analysis Quick Reference Guide* under “Report Qualifiers”). For instance, in the example above, “AD” represents average day.

Type — in most cases, this represents the methodology used to compute the statistic, and the type of statistic, e.g., “Combined Relative Precision” or “Standard Error Combined Ratio Mean KW”. This field is automatically filled in by the Oracle Utilities Load Analysis program using a 4-character code (which is reproduced in the *Oracle Utilities Load Analysis Quick Reference Guide* under “Statistic Qualifiers”). For instance, in the example above, “CMEN” represents “Combined Ratio Mean KW”.

- **Stratum Number** identifies the group for which the statistic was computed. The value is automatically assigned in the statistics identifier by Oracle Utilities Load Analysis (based on your input in the analysis Control files). Strata are assigned digits “1” through “9” if no more than nine strata are in the class. If there are more than nine strata, the program automatically adds 2 digits to the statistic prefix (for example, RESH-01 for stratum 1), and leaves a “0” in the stratum number field.

  Note: A stratum number of 0 may indicate “Entire Period.”

  If there are no strata (such as for sample statistics), Oracle Utilities Load Analysis puts a “0" in the stratum number field.

- **Start-time** indicates the start-time of the analysis period. It is important to note that, for *all* statistics, this date and time represent the *beginning of the entire period examined in the analysis*, **not the particular date or date range represented by a specific statistic**. For example, if a statistic were computed for the day of class peak during the month of May, the start-time in the identifier would be 05/01/89-00:00:00, even if the class peak occurred on May 7th. This approach is designed to ensure that all statistics for a given analysis period can be identified together. An alternate method of separating and arranging your statistic records is to set up databases to specially hold the records. All Analysis programs have the capability to read Interval data from one database and write the statistics to another. Both of these databases need to be defined on the server as ELDBs.

  The conventions for expressing start-times for statistics are the same as for load data records.

Header and Interval Data for Statistics Records

Each field is described in detail below and on the following pages. The fields are described in the order in which they appear on the report.

- **Statistics Name** appears in the field labeled “customer-id”. See the previous page for a further description.
- **Stratum Number** appears in the field labeled “channel-number”. See the previous page for a further description.
- **Start-time** represents the beginning of the analysis period.
- **Stop-time** is the stop time, calculated based on the number of data values in the record.
- **Descriptor** is an 80-character field specifying the type of statistic in the report. It is automatically filled in by Oracle Utilities Load Analysis.
- **Time span** — “Expected” describes the entire period under analysis; “Recorded” describes the time span for the computed statistic.

  Note: The number of *recorded* intervals is the number of intervals or data values that will appear in the second half of the statistics record.
- **Seconds/interval** is typically the length of each interval. You determine this value before analysis or reporting.
- **Population** — You enter this value in the Environment File before running the analysis programs.
- **Weight** — You assign this value before running the analysis programs.
- Number of **Time-of-Use periods** is automatically filled in by Oracle Utilities Load Analysis.
- Number of **Supplied Peaks** is automatically filled in by Oracle Utilities Load Analysis.
- **UOM** stands for “Unit of Measure” and identifies the type of data stored in the interval portion of the record. See *Appendix J: Oracle Utilities Unit of Measure Codes* for a list of these codes and their meanings.
- **Pulse Multiplier and Pulse Offset** are shown only for certain load data records; they are not meaningful for statistics.
- **Energy** is the sum of the interval energies.
- **Sample Titles and Day and Time of Peak for Peak Statistic Records** sometimes appear in the Title or Description field. Up to three sample titles or peak times (which you assign before analysis) are stored in this field. These titles appear in reports produced by the Time Series Reporter.
- **Edit Trails** are not used for statistics records.
- **Interval Data** — The values reported in this portion of the record have different meanings, depending upon the type of statistics record. For Entire Period and Average Day records, the values represent estimates for the group, interval by interval. For Time-of-Use statistics, the values represent estimates of energy, demand, or load factor by time period.

  Note: When viewing reports of interval data, all statistics should be viewed as energy data, not demand data.
- **Status Codes** — each computed statistic value has a status code of blank (‘ ’). Values that cannot be computed have a value of zero and a status code of ‘9’.
- **Flags and record type** have no meaning in statistics records.

LOAD DATA RECORD FIELD	VALUE IN STATISTIC RECORD
Customer ID	Statistic Name
Channel	Stratum Number 0 = Entire Period, 1= Stratum 1 etc.
Start Time	Start Time of analysis period
Stop Time	Calculated time based on the number of data values in the record
Title or Description 1 2 3	Sample Title Sample Title Day and Time of Peak for a Peak Statistic Record

Figure 3-3 Summary of Fields Used in Both Load Data Records and Statistics Records

Chapter 4

Oracle Utilities Load Analysis Mechanics

This chapter is intended primarily for anyone unfamiliar with the basic concepts of input and output files. However, the chapter also defines some important terms unique to Oracle Utilities Load Analysis, such as “Environment files” and “Control files.” Topics covered in this chapter are:

- **What Input Files are Used in Oracle Utilities Load Analysis?**
- **What Output Files Does Oracle Utilities Load Analysis Produce?**
- **Naming Conventions in Oracle Utilities Load Analysis**
- **Using the Preprocess Key Generator in a Control File**
- **Querying the Database with Embedded SQL**

Before you begin working with Oracle Utilities Load Analysis, you might want to review some of the basics of working with the programs on your computer system.

You typically accomplish tasks by submitting custom command files or Client/Server Oracle Utilities Load Analysis "jobs" that run programs. Each program requires input files and produces output files. Output files may be used as the final result (reports, for example), or become input for other programs.

Another way of looking at this is that you can accomplish the tasks by following three main steps:

1. Creating Input Files
2. Running the Program
3. Checking Output Files.

What Input Files are Used in Oracle Utilities Load Analysis?

Most Oracle Utilities Load Analysis programs use two types of input files: *control files* and *environment files.*

- **The Control File** typically contains the data to be processed. Customer lists and lists of keys for load data records are common kinds of control files.
- **The Environment File** contains your processing instructions to the program. Typically, you select among a set of optional parameters to define the file.

Some programs also use one or more of the following files: *Time of Use File, Holiday File,* and/or *auxiliary database (AXDB).* The first two are typically set up at system installation. The AXDB is explained in *Chapter 7: Using the Auxiliary Database (AXDB) to Modify Incoming Data (X170, X180).*

What Output Files Does Oracle Utilities Load Analysis Produce?

Output — the result of running a program — can be new or modified data entered into a database, or reports. Aside from special reports, several reports are automatically produced by Oracle Utilities Load Analysis to help you evaluate the success of the program run. (These reports are typically bundled into a single output file called "REPORT.HTML".)

- **The Environment Report** describes the processing mode in effect during the program run. Use this report to verify that you entered the correct commands and parameters in the Environment File.
- **The Execution Log** typically lists data that was altered or created during the program run; it often includes diagnostic messages that alert you to any problems with the input data or the run.
- **The Summary** usually provides counts of records entered or modified in the database as a result of the run.

Naming Conventions in Oracle Utilities Load Analysis

Elements of the Oracle Utilities Load Analysis program are identified by a consistent set of naming conventions. Being able to recognize programs and input files by these naming conventions will be a big help to you in working with the system. Here are the conventions used in the Load Data Management Subsystem:

Element	Convention	Example
Programs	TGX_ _ _.EXE	LTGX310 = Load Data Editor
Control files	TGX_ _A.CTL	TGX31A = Load Data Editor Control File
Environment files	TGX_ _B.ENV	TGX31B = Load Data Editor Environment File
Output files	TGX_ _1.DAT	TGX311 = Load Data Editor Output File

Output files can be input files to other programs. In that case, the identifiers are assigned according to what program they are going into. For example, the Validation Control File from Editing is identified by “TGX21A.CTL”.

The “X” that appears consistently above refers to elements of the Load Data Management System. The convention for programs, procedures, and files in the Load Data Analysis System uses a “Y” in the same position.

> **Note:** These are the conventions Oracle Corporation assigns. You are not required to use these conventions when executing the programs — you can assign identifiers of your own. However, a logical set of identifiers is useful.

Using the Preprocess Key Generator in a Control File

Traditionally, using a key generator query to run a report required submitting two separate jobs. For example, to run the X440 program using a list of generated keys you had to:

1. Submit an X810 Key Generator job.
2. Submit an X440 Summary Reporter job using the results returned from the X810 job.

This example requires the following steps:

1. Create the X810 CTL file.
2. Run the X810 Key Generator.
3. Wait for the job to complete.
4. Copy the contents of the generated output list and paste it into the X440 CTL file.
5. Run the X440 Summary Reporter.

Now you can use the Preprocess Key Generator to consolidate these steps into one job by embedding key generator logic into a control file. Doing so allows you to dynamically create a list of full or partial keys to be used by the program.

For example, you can include the following key generator commands in your X440 control file to run the Summary Reporter on all cuts with a CUSTID that begins with “N”:

```
L1: SUBSTR(CUSTID,1,1) = 'N' T(PRINT 1) F(NEXT)

FORMATS:
1: TRIM(CUSTID) ', ' TRIM(CHANNEL)
```

Note:

For programs that can run against multiple databases, the preprocessor will only run against the primary database selected (CLDB if selected, ALDB if no CLDB is available).

If an error occurs during the key generator query process, the job will be aborted with return code 99. Key generator outputs (such as sysprints and reports) will remain in the job output folder. You can use these files to troubleshoot the error that occurred.

For more information about the key generator program see [cross reference to LDM Chapter 15]

Preprocessing Options

You can use the following optional features with the preprocess key generator:

Keys List (Optional)

The keys list command provides the same functionality as the optional keys list file used by the key generator program. This command allows you to filter the results of the pre-processing query to a select subset of keys.

To supply an optional key generator keys list, enter the following statement at the end of your pre-process control file:

```
KEYSLIST:
```

Following the KEYSLIST statement, supply your list of keys (full or partial) in the subsequent lines using the following syntax:

```
KEYSLIST:
custid channel [start-time]
```

Example CTL file with KEYSLIST statement:

```
L1: SUBSTR(CUSTID,1,1) = 'N' T(PRINT 1) F(NEXT)

FORMATS:
1: TRIM(CUSTID) ', ' TRIM(CHANNEL)

KEYSLIST:
N1723, 1
N1725, 1
```

Environment File (Optional)

The Preprocess Key Generator uses the tgx81b.env file in the COMMON/DATA directory as a default environment file. If this file is not found, the key generator will create one with the following default value:

PRINT ECONOMY

You can override this setting to provide a custom environment file by using the following statement at the end of your pre-processing control file.

```
ENV:
```

Following the ENV statement, enter your environment commands. The following is an example:

```
/* FIND CUTS WITH MORE THAN 1 EDIT (EACH EDIT PRODUCES 2 TRAILS)
L1: TRAILCT > 2 T(PRINT 1) F(NEXT)

FORMATS:
1: TRIM(CUSTID) ', ' TRIM(CHANNEL) ', ' TRIM(START)

KEYSLIST:
N1723, 1
N1725, 1

ENV:
TRAILS
PRINT ECO
```

Supported Programs

The following Load Analysis programs support the Preprocess Key Generator:

- X210 Cut Series Validation
- X310 Load Data Editor (CLDB)
- X410 Load Data Reporter
- X430 Totalizing Reporter
- X440 Summary Reporter
- X470 Late Cut Report
- X480 Validation Statistics Reporter
- X490 Cut Series gap Reporter
- X530 Cut Series Overlap reporter
- X720 Direct Output (CLDB)
- Y230 Billed Energy Program

- Y240 Load Data Extraction
- Y310 Standard Load Data Analysis
- Y320 Aggregate Load Analysis
- Y330 Ratio Analysis
- Y350 Domain Analysis MPU
- Y360 Domains Analysis Ratio
- Y370 Individual Customer Analysis
- Y380 100% Sample Analysis
- Y410 Time Series Reporter
- Y620 Load Data Transformation
- Y630 Load Data Editor (ELDB)
- Y720 Direct Output (ELDB)
- Q91C Copy Cuts
- Q91D Delete Cuts
- Q91M Move Cuts

Querying the Database with Embedded SQL

The key generator has traditionally been used to query the database to create a list of cuts or cut series for input into programs. The key generator works well for complicated query logic, but it can be inefficient when used to search for cuts in a large database. For that situation, a better way to query the database is with embedded SQL Statements.

SQL statements can be embedded in an input control or key list file for programs that take a list of cuts or cut series as input. The SQL is used to query the database and return a list of cut or cut series before the a program is run. The control file or key list file that contains embedded SQL will have the SQL statements replaced with the results of the query before the main program is processed.

Syntax for Embedded SQL Statements

All embedded SQL statements are identified by the keyword @SELECT and use the following syntax:

```
@SELECT selectFields WHERE whereConditions
```

Where:

selectFields are a comma-separated list of cut values to return. See **Selection Field Names** for a list of available field names.

whereConditions are a set of conditions from which to use as criteria for selection. The where conditions have the following format:

```
FIELD comparison-operator VALUE
```

Where:

FIELD specifies the field name which will be the target of the selection criteria. See **Selection Field Names** for a list of available field names.

comparison-operator specifies the logic to use for the comparison. See **Comparison Operators** for a list of available operators.

VALUE specifies a value to compare the field to. Values can be of type string, numeric, or Boolean.

Values should be in the following formats:

- String data types must be enclosed in single quotes ('example').
- Boolean values must be 'YES', 'Y', 'TRUE', 'NO', 'N', or 'FALSE'.
- Numeric values (NUM values) must be numeric with no plus (+) signs. They can either be in single quotes or not.
- Dates must to follow the standard Oracle Utilities Load Analysis convention (MM/DD/YY-HH:MM:SS or MM/DD/YY). They can either be in single quotes or not.
- Lists need to be enclosed in parentheses and values separated by commas. For example:

  ```
  CUSTID IN ('N1723', 'N1724')
  ```

The following is an example of an embedded SQL query statement:

```
@SELECT CUSTID, CHANNEL WHERE CHANNEL = 1
```

You can set multiple where conditions by joining them using AND and OR statements. Sets of conditions can be grouped together by enclosing them in parenthesis "()".

For example, to select a list of cuts in which the CUSTID is equal to “N1723” and CHANNEL is equal to 1, or in which the CUSTID is equal to “N1725” and CHANNEL is equal to 1, you would use the following statement:

```
@SELECT FKEY WHERE (CUSTID= 'N1723' AND CHANNEL=1) OR (CUSTID'N1725'
AND CHANNEL=1)
```

Escape Characters

Single quotes, underscores, and percent symbols are special text characters. Single quotes are used to designate the beginning and end of a text field. Underscore and percent symbols are used as wildcard characters. To represent text with these characters literally, they will need to be escaped:

To Use Single Quote: Use double single quotes to represent text with apostrophe or single quote literal.

Example:

```
@SELECT PKEY WHERE DESCRIPTOR LIKE '%MARK''S PIZZERIA%'
```

To Use Underscore and Percent Sign: Use the backslash character ("\") to escape underscore and percent symbols. This applies only when using the LIKE operator, where "_" and "%" are wildcard characters.

Example:

```
@SELECT PKEY WHERE CUSTID LIKE 'MONDAY\_CUT'
```

Selection Field Names

The following table lists the valid field names that can be used in embedded SQL queries:

Field	Type	Description	Clause
FKEY	Text	Returns a list of cuts, or full keys (CUSTID, CHANNEL START).	SELECT
PKEY	Text	Returns a list of cut series, or partial keys (CUSTID, CHANNEL).	SELECT
CUSTID or RECORDER	Text	customer-id (recorder-id)	SELECT, WHERE
CHANNEL	Numeric	Channel (stratum)	SELECT, WHERE
START STARTTIME	Date	Start-time	SELECT, WHERE
DTSTAMP CHNLCUTTIMESTAMP	Date	Timestamp	WHERE
STOP STOPTIME	Date	Stop-time	WHERE
MSTART STARTREADING	Numeric	Meter-start Reading	WHERE
MSTOP STOPREADING	Numeric	Meter-stop Reading	WHERE
MMULT METERMULTIPLIER	Numeric	Meter Multiplier	WHERE
MOFFSET METEROFFSET	Numeric	Meter Offset	WHERE

Field	Type	Description	Clause
PMULT PULSEMULTIPLIER	Numeric	Pulse Multiplier	WHERE
POFFSET PULSEOFFSET	Numeric	Pulse Offset	WHERE
POP POPULATION	Numeric	Population	WHERE
WEIGHT	Numeric	Weight	WHERE
SPI	Numeric	Seconds Per Interval	WHERE
UOM UOMCODE	Numeric	Unit of Measure Code	WHERE
TIMEZONE	Numeric	Timezone	WHERE
DESC DESCRIPTOR	Text	Descriptor	WHERE
TZSN TZSTDNAME	Text	Timezone standard name	WHERE
EDITBYRS	Boolean	Edited By Rules Language flag	WHERE
EDITED	Boolean	Edit flag	WHERE
INTVALID INTERNALVALIDATION	Boolean	Interval Validation Flag	WHERE
EXTVALID EXTERNALVALIDATION	Boolean	External Validation Flag	WHERE
MERGE MERGEFLAG	Boolean	Merge Flag	WHERE
ARCHIVE DELETEFLAG	Boolean	Archive Flag	WHERE
ORIGIN	M,S,P	Origin Flag	WHERE
VALFLAGE	E or blank	Validation Flag (Energy Discrepancy)	WHERE
VALFLAGI	I or blank	Validation Flag (Number of Intervals)	WHERE
VALFLAGO	O or blank	Validation Flag (Outage)	WHERE
VALFLAGN	N or blank	Validation Flag (Non-normal)	WHERE
TKWRIT	Boolean	TK Written Flag	WHERE
DST	Y or N	DST Participant Flag	WHERE
INTERVALCOUNT	Numeric	Interval Count	WHERE
DCFLOW	D	DC Flow	WHERE
VMSG MESSAGETEXT	Text	Validation Messages	WHERE

Field	Type	Description	Clause
TRAIL EDITTEXT	Text	Edit Trails	WHERE

Comparison Operators

The following table lists the valid comparison operators that can be used in embedded SQL queries:

Comparison Operator	Description
=	Equal to
!=	Not equal to
>	Greater than
<	Less than
>=	Greater than or equal to
<=	Less than or equal to

LIKE	Wild-card comparison. The wild-card patterns that you can use are:
	• % : match any string of any length (including zero length)
	• _ : match on a single character
	Example:
	`CUSTID LIKE 'RES%'`
	`CUSTID LIKE 'RES10_'`

NOT LIKE	Inverse of LIKE.

IN	Equal to a list of values. Lists must be enclosed in parentheses and comma separated.
	Example:
	`CHANNEL IN (1,2)`
	For regions where comma is used as decimal digit, numeric values must be enclosed in single quotes.
	Example:
	`METER_MULTIPLIER IN ('1,02', '2,01')`

NOT IN	Inverse of IN.

Supported Programs

The following Load Analysis programs support embedded SQL queries:

In CTL files:

- X210 Cut Series Validation
- X410 Load Data Reporter
- X440 Summary Reporter
- X470 Late Cut Report
- X480 Validation Statistics Reporter
- X490 Cut Series gap Reporter
- X530 Cut Series Overlap reporter
- X720 Direct Output (CLDB)
- Y240 Load Data Extraction
- Y720 Direct Output (ELDB)
- Q91C Copy Cuts
- Q91D Delete Cuts
- Q91M Move Cuts

In KYS files:

- X810 Key Generator

Chapter 5

Getting Data into the Extracted Load Database (Y130, Y220, Y240)

The previous chapters explained the "big picture" of what Oracle Utilities Load Analysis does and why. The remainder of this guide will look more closely at each of the most commonly used procedures in the Load Data Analysis Subsystem.

This chapter describes the first step in working with the subsystem — getting the necessary data organized and input to the Extracted Load Database (ELDB). This chapter focuses on the program most commonly used for this purpose — ALDB/CLDB/ELDB *Load Data Extraction* (Y240). Two alternative programs, *Manual Entry (ELDB)* (Y220) and *Direct and Production Input (ELDB)* (Y130, Y131), are also described briefly. Topics covered are:

- **What Does ALDB/CLDB/ELDB Extraction Do?**
- **Deciding Whether to Extract Data from the ALDB, CLDB or ELDB**
- **Establishing Guidelines for Data Extraction**
- **Record Flags and Validation Tests — Oracle Utilities Load Analysis "Quality Control" Mechanisms**
- **Steps for Using the ALDB/CLDB/ELDB Extraction Program (Y240)**

The first step in the analysis process is to put the load data to be analyzed into the Extracted Load Database (ELDB) — the working area for the Load Data Analysis Subsystem. Three programs are available for this purpose:

- **ALDB/CLDB /ELDB Load Data Extraction (Y240)** — extracts data from other Oracle Utilities Load Analysis databases — the Archive Load Database (ALDB), the Current Load Database (CLDB), or both. This is the recommended method, and is described in detail in this chapter.

  Note: This program supports embedded SQL commands. See **Querying the Database with Embedded SQL** on page 4-7 for more information. The program supports pre-process key generator. See **Using the Preprocess Key Generator in a Control File** on page 4-4 for more information.

- **Manual Entry (Y220)** — inputs manually created files to the ELDB. You would typically use this program to input data that does not already exist in electronic media, or is such a small amount that it's actually quickest to input by hand. See the *Oracle Utilities Load Analysis Load Data Management User's Guide* for instructions.
- **Direct and Production Input (Y130, Y131)** — reads load data from an input file directly into the ELDB. This procedure is identical to the Direct and Production Input programs described in the *Oracle Utilities Load Analysis Load Data Management User's Guide,* with the following exception:
  - Because the input data is assumed to be accurate, this procedure does not include Validation, and the Load Data Reporter Exception Report is not produced (should include the VALID option in Environment File).

Because this approach bypasses the validation checks that have been designed to help ensure data quality, it is not recommended *unless you are absolutely certain that the data is accurate*. Otherwise, you should use X110/X111 to input the data to the CLDB, then extract it using Y240 after it has passed all validation tests. (See *Chapter 6, "Entering and Validating Data Using the Production Input, Direct Input, or Load Data Input Programs,"* in the *Oracle Utilities Load Analysis Load Data Management User's Guide,* for details.)

What Does ALDB/CLDB/ELDB Extraction Do?

Load Data Extraction (see Figure 5-1: ALDB/CLDB/ELDB Extraction) takes a copy of load data from the ALDB, CLDB, and ELDB or all and inputs it to the ELDB, where you can apply any of several Oracle Utilities Load Analysis Analysis programs to it. You can extract data for any subset of customers over any calendar period that exists in the ALDB, ELDB and/or CLDB. The program automatically combines duplicate or conflicting data according to a prescribed set of rules, creating a single record at a uniform frequency and unit of measure for each customer.

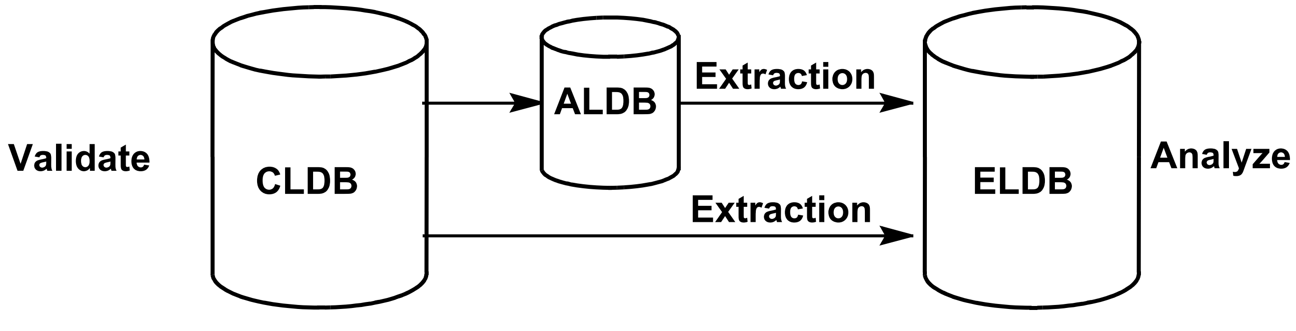


Figure 5-1 ALDB/CLDB/ELDB Extraction

This process takes data from the on-line Current Load Database and/or off-line Archive Load Database.

Deciding Whether to Extract Data from the ALDB, CLDB or ELDB

Because the quality of load data is critical to the success of the analysis, it is important to understand the potential differences between data originating in the ALDB and data originating in the CLDB. Each source has advantages and disadvantages:

- **From the ALDB** — According to recommended Oracle Utilities Load Analysis procedure, all data in the ALDB has been validated and released for analysis. If this procedure has been followed, the ALDB data will yield the most reliable results.
- **From the CLDB** — The CLDB is the on-line working database for the Load Data Management Subsystem. Cuts in the CLDB are typically in the process of being validated and edited. Data taken from the CLDB may be invalid and incomplete, as CLDB cuts are more recent than archived cuts.
- **From the ELDB** — The ELDB contains extracted cuts that have been validated and are ready for the analysis programs.
- **All** — As a practical matter, data over the period of interest may be split between the ALDB, ELDB and CLDB. The Extract process allows you to extract from either or all databases.

  Note: To save time, you can run extraction against just the CLDB immediately before running Archive/Delete to archive valid data to the ALDB or ELDB.

Establishing Guidelines for Data Extraction

Although data extraction is a relatively simple process, it can have a big impact on the quality of your analysis, and on the efficiency of your operation. A standardized approach, where everyone is aware of the procedures, can be of great value.

Of course, each utility is organized differently and will require its own approach. However, the following recommendations should be useful for any organization:

1. Establish a routine for extracting data on a regular basis

   Data from the field is typically collected at different times for different customers. It then requires some time and effort for validation, editing, and archiving by the Data Management Department. It is a good idea to work with your Data Management Department to determine a schedule when all data over a given calendar period (usually one month) will be complete and ready for analysis. Sixty days after the extraction period is reasonable.

   It is also helpful to move data into the ELDB in uniform and consistent increments of time (for example, always one month; rather than first a week, then a month, etc.) and to accumulate consecutive cuts until either the ELDB is full or you reach the end of your test year. This approach helps avoid gaps and overlaps in the data.

2. Extract interval data at the highest frequency that will be required, but no higher.

   The higher the data frequency, the more intervals per time period, and the more space taken up in the database. Therefore, you should extract data at the lowest frequency that will meet your needs.

3. Avoid extracting duplicate data or data for overlapping time periods.

   Because extracted data automatically overwrites any existing data in the ELDB that has the same cut key, you must be careful to avoid inadvertently erasing valuable data. For example, suppose your ELDB contains a year of data for customer “B001, 1” beginning at 01/01/99-00:00:00. (The key for the data would be “B001, 1, 01/01/99-00:00:00”.) If you were to extract a new cut from the ALDB with the key “B001, 1, 01/01/99-00:00:00” containing only one month of data, the existing data in the ELDB for the entire year would be replaced by the new, month-long cut.

If you were to extract a month of data with a different key, say “B001, 1, 02/01/99-00:00:00”, it would be input alongside the existing ELDB data. You would then have two sets of possibly conflicting data for the same time period (the month of February).

You may wish to have multiple sets of data for one customer over the same time period. For example, you may want one set for billing purposes and one set for forecasting. In those instances, Oracle Utilities recommends that you create separate records, or even separate versions of the ELDB. Generally, you should avoid overlapping data. Use the Overlap Reporter (Y530, Y531) to identify overlapping data in any Oracle Utilities Load Analysis database.

4. Always review the ALDB/CLDB/ELDB Extraction Execution Log to check extracted data before analysis.

   > **Note:** You may now run the Extraction program in the “TRIal mode” to investigate the CLDB% COMPlete value.

   The Extraction Program considers a cut eligible for extraction if it has just one interval of data in the extraction period. You have no way of knowing if the extracted cut has missing intervals unless you look at the Extraction Execution Log. Specifically, the “% COMP” column will indicate how much good data was found for each customer.

5. Assign responsibility for the database(s) to one individual or one group.

   In some organizations, it is helpful if one person is responsible for the ELDB and extraction procedures, ensuring that the integrity of the data is preserved.

6. Work closely with your Data Management Department to ensure data quality.

   The Oracle Utilities Load Data Management Subsystem incorporates procedures to ensure that all load data has passed tests for quality and completeness before it is released for analysis. However, these procedures can be overridden. (See the following section on Record Flags.) Make sure that you are aware when and if these procedures have been bypassed.

Record Flags and Validation Tests — Oracle Utilities Load Analysis “Quality Control” Mechanisms

In the Load Data Management Subsystem (LDMS), record flags are used to manage the progression of a cut through the input, validation, editing, and archiving procedures. *Proper use* of these flags ensures that the data made available for analysis meets user-defined quality standards. When extracting cuts from the ALDB or CLDB, it is important that you understand the meanings of these flags.

Here is a brief description of the record flags used in the ALDB and CLDB. See the *Oracle Utilities Load Analysis Load Data Management User’s Guide* for a more detailed explanation of the record flags and the validation tests.

- **Internally valid** — This flag indicates whether or not the cut has passed a series of “internal validation” tests that evaluate the cut’s status codes, start- and stop-times, energy values, and meter readings against user-defined criteria. The LDMS automatically sets this flag during the Validation procedure.

  > **Note:** Internally invalid data can **not** be extracted unless the Merge Flag is forced using the CLDB Load Data Editor (X310).

- **Externally valid** — This flag indicates whether or not the cut has passed a series of “external validation” tests that determine if there are unacceptable gaps or overlaps between the interval data in the cut and the cuts following it in the same series. The LDMS automatically sets this flag during the Validation procedure.

> **Note:** Oracle Utilities Load Analysis always flags the most recent cut as externally invalid, because there is no following cut to compare it with. An *externally* invalid cut **can be** extracted from the CLDB.

- **Merge** — Properly used, the Merge Flag enables you to separate "good" data that is ready for analysis from "bad" or untested data that is not ready for analysis.

  This flag indicates whether or not the cut has passed the validation tests and is OK to merge — in other words, OK to move from the ALDB to the ELDB for analysis. Oracle Utilities Load Analysis automatically sets this flag to Y (Yes) on valid cuts during the Archive procedure when they are moved from the CLDB to the ALDB. However, it is possible to override this process and to force the flags on untested or even invalid cuts using the CLDB *Load Data Editor* (X310). *This is* ***not*** *recommended.*

These flags tell you whether the cut is eligible for analysis.

- **Archive** — This flag indicates whether or not the cut is OK to archive — in other words, OK to move from the CLDB to the ALDB or ELDB. A cut can be OK to archive even if it is not OK to merge. It is possible to force the Archive Flag to Y (Yes) with the Load Data Editor, but the preferred procedure is to allow Oracle Utilities Load Analysis to automatically set it during the Archive procedure.
- **Edited** — This flag indicates whether or not the record has been edited. You might be interested to know that the LDMS stores three versions of edited cuts in the CLDB and ALDB — the most recently edited ("Active") version, the original ("Inactive") version, and a list of all edits made to the cut ("edit trails"). However, the Extraction Program takes only the active version for input to the ELDB.

Important note about Data Quality Requirements for Extraction

The Extraction Program extracts only cuts that meet the following criteria:

- **From the ALDB** — the cut must be marked for merge.
- **From the CLDB** — the cut must be internally valid or marked for merge.

  This eligibility criteria enables you to extract data from the CLDB that is *internally valid but externally invalid*, giving you the option of analyzing data in the "work-in-process" stage. It also allows data that is *both internally and externally invalid* to be extracted and analyzed by *marking the cut for merge* using the Load Data Editor. However, *careful consideration should be given when extracting invalid data because of its impact on analysis results.*

  In addition, each cut must have at least one interval of data in the extraction period.

Steps for Using the ALDB/CLDB/ELDB Extraction Program (Y240)

Here is a brief list of the steps you will follow when extracting data from either the ALDB or the CLDB. The remainder of this chapter explains each step in detail.

Summary — Using the ALDB/CLDB/ELDB Extraction Program (Y240)

1. Create the Extraction Environment File (TGY24B.ENV).
2. Create the Extraction Control File (TGY24A.CTL).
3. Run the Load Data Extraction Program (Y240).

Figure 5-3: Overview of ALDB/CLDB/ELDB Extraction summarizes the inputs you must provide and the outputs you can expect.

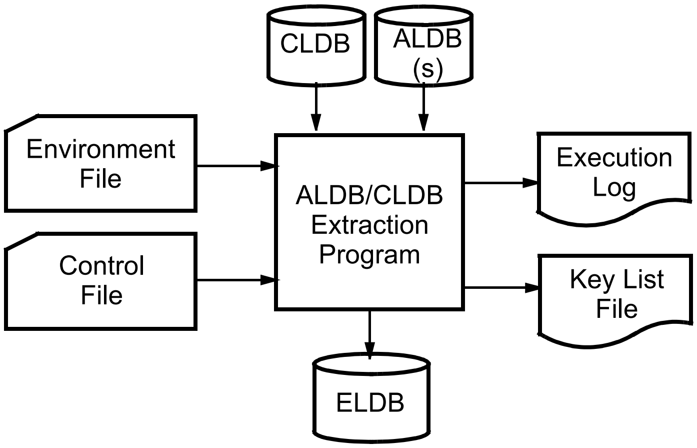


Figure 5-3 Overview of ALDB/CLDB/ELDB Extraction

Step 1: Create the Load Data Extraction Environment File (TGY24B.ENV)

With the Extraction Environment File, you determine the date range, recording frequency, and source of the load data. Construct the file using the commands shown in the box below. Input one command and its associated parameters per line:

DATe *start-date stop-date*

AGGregate [*n* | 3600]

SOUrce [**ALDB** [2] | **CLDB** | **BOTH** [2]]

PRInt [**ECOnomize** | **FULl**]

REPort [**INComplete** | **ALL**][**TRIal**][**CSV**]

DROp *d*%

DATe *start-date stop-date*

- **Date** — (required) Use this command to establish the start-date and stop-date of the extraction period. Input the dates in either the “mm/dd/yy” format or the “mm/dd/yy-hh:mm:ss” format. Separate the dates with a blank and/or a comma. Remember, the program extracts in increments of whole days, so the start-time of the period will automatically be “00:00:00” and the stop-time will be “23:59:59”.

  You can extract up to 36,000 intervals — that is, approximately 4 years of hourly data or 1 year of 900-second data.

  > **Note:** The date range may be overridden for an individual cut series by date parameters on a Control File request.

AGGregate [*n* | 3600]

- **Aggregate** — (required) Use this command to set the interval length (seconds per interval) on the extracted cuts. The parameter “n” must be a factor of 3600; that is, 300, 900, 1800, 3600, or 86400.

Note: Intervals may be *summed* or *averaged* during aggregation, depending upon the type of data. The aggregation technique used by the program for each unit of measure is noted in *Appendix J: Oracle Utilities Unit of Measure Codes*.

SOUrce [**ALDB** [2] | **CLDB** | **BOTH** [2]]

- **Source** — Select the source of the data; either the ALDB, the CLDB, or both. BOTH is the default. To process more than one ALDB, type “2” following ALDB or BOTH.

  Note: ALDB/CLDB/ELDB Extraction accepts up to two ALDBs as input. The procedure as delivered expects only ALDB1, and has a deactivated file definition for ALDB2. If you want to take advantage of the multiple ALDB feature, it is necessary to activate ALDB2. If in subsequent runs you want to process only ALDB1, it is necessary to deactivate ALDB2.

PRInt [**ECOnomize** | **FULl**]

- **Print** — Use this command to reduce the size of the ALDB/CLDB/ELDB Extraction Execution Log. The Economize option omits the dotted and blank separator lines between cuts. The program default (Full) creates the Execution Log with full separation.

REPort [**INComplete** | **ALL**][**TRIal**][**CSV**]

- **Report** — Use this command to further limit the size of the ALDB/CLDB/ELDB Extraction Execution Log. If you choose the Incomplete option, only those cuts written to the ELDB that are less than 100% complete will be listed in the Log. The program default (All) lists all cuts written to the ELDB.
  - **TRIal**: Use this sub-command to perform a trial extraction in which the report generated, but nothing is written to the database.
  - **CSV**: Use this sub-command to create a new output file (OUTPUT.CSV) that contains the basic context of the report in a comma-separated format. This format includes the following fields: CUSTOMER ID, CHANNEL, START DATE, STOP DATE, %COMPLETE, SOURCE, and STATUS

DROp *d*%

- **Drop** - Use this command to establish the threshold for dropping cuts that are incomplete. Cuts that are less than d% complete will be dropped.

  The value for “d” must be a non-negative integer between 0 and 100, inclusive. The percent symbol (%) is optional. The default is “0”, meaning no cuts will be dropped.

```
DAT   03/01/99  03/01/99
AGG   3600
SOU  CLDB
DRO  10%
```

Figure 5-4 Sample Load Data Extraction Environment File

Step 2: Create the Load Data Extraction Control File (TGY24A.CTL)

This is a required file containing a list of the customers for extraction, identifying each customer by customer-id and channel-number. You can create this list manually, or by using the Customer

Data Extraction or Key Generator programs. Whichever method you choose, each key in the Control File must follow this format, one key per line:

customer-id, *channel* [,*start-time* | ,*start-date*,*stop-date*]

You can separate the customer-id and channel-number using a blank or a comma. Start-time is optional, and requests a specific cut within the Environment File extraction period for a customer-id/channel-number. Start-date and stop-date are optional and indicate an alternate extraction period to be used for a customer-id/channel-number, overriding the period specified in the Environment File (see Figure 5-4: Sample Load Data Extraction Environment File).

```
B0001, 1            /*LIST OF KEYS TO BE EXTRACTED
C5862, 1
F3290, 1, 01/02/99-04:00:00
F3290, 2, 01/02/99, 02/01/99
```

Figure 5-5 Sample ALDB/CLDB/ELDB Extraction Control File

This files uses optional Start-Time, Start-Date, and Stop-Date. In this example, the program would extract data for the cut series B001, 1 and C5862, 1 using the date range specified in the Environment File. For F3290, 1, the program would extract intervals only from the cut with the start-time 01/02/99-04:00:00 and falling within the date range in the Environment File. For F3290, 2, the program would extract data for the date range 01/02/99 through 02/01/99.

Step 3: Run ALDB/CLDB/ELDB Extraction Program (Y240)

After you have created the two input files, you are ready to run the *Load Data Extraction Program*. Submit the job using Y240.

ALDB/CLDB/ELDB Extraction Program (Y240)

The ALDB/CLDB/ELDB Extraction Program initially evaluates the cuts on each database to determine their eligibility for the merge process. *Separate merged results are obtained for the ALDB and CLDB; the two are then combined on the final output to the ELDB.* This allows the *Load Data Extraction Program* to communicate comprehensive diagnostics about each database.

The program will extract all cuts from the specified database(s) that are:

- Marked for merge or (for CLDB cuts) internally valid
- Have one or more intervals that fall in the date range specified in the Environment File

Once the data is extracted, the program merges all cuts for each individual customer-id and channel-number into a new ELDB cut for the extraction period, using the following guidelines:

- Merging is performed in chronological order.
- If the units-of-measure between two cuts are not compatible, the first cut is filled with missing intervals (value zero with status code of 9) up to the start time of the more recent cut. For example, merging two cuts with the same Cust ID but two incompatible UOM's (the first cut was degrees and the second cut was dollars) and start and stop times of 7/1/81 through 8/1/81 (the first cut) and 8/2/81 through 8/30/81 (the second cut) would result in the entire first being replaced with missing intervals. See **UOM Compatibility** in **Appendix J**: **Oracle Utilities Unit of Measure Codes** for more information about compatible UOMs.
- Only data in the extraction period is merged.
- If an overlap occurs, the chronologically most recent data is used.

- If a gap occurs, “0” with a status code of ‘9’ is entered for each missing interval.
- Merged data excludes invalid data, and “0” with a status code of ‘9’ is entered for each excluded interval.

If a cut with the same cut key already exists in the ELDB, the old data will be replaced by the new cut.

Each cut entered into the ELDB will have the following characteristics:

- Start-time is 00:00:00; stop-time is 23:59:59
- Meter information fields are set to zero
- Validation messages are set to blank
- Internal and external validation flags are set to Y (Yes); Edit, Archive, and Merge flags are set to N (No).

Chapter 6

Modifying Customer Load Data Prior to Analysis Using the ELDB Load Data Editor (Y630)

This chapter introduces the ELDB Load Data Editor, which enables you to modify customer load data records in the ELDB. You might use this program to correct bad or missing data, or to create new cuts from old ones.

Topics covered in this chapter:

- **Overview**
- **Using the Load Data Reporter to Examine Cuts**
- **Steps for Using the ELDB Load Data Editor (Y630)**

> The kinds of modifications you can make with the Editor are fairly straightforward (e.g., cutting and pasting data and specifying old values for new ones). If you need to combine records or perform calculations on the data, see **Chapter 15**: **Performing Ad Hoc Load Calculations Using the Transformation Program (X620, Y620)**.

Overview

Occasionally, you may need to modify customer load data in the ELDB before applying the analysis programs to it. For example, if you were performing an analysis for forecasting purposes, you would probably replace any outages in a customer's record with estimated values. (Although the outages reflect actual customer usage, they are likely to be abnormal events that are not appropriate to include in forecasts of future use.) Or, let's say you wanted to analyze a hypothetical case and needed to synthesize test data from existing cuts. In either case, you could use the Load Data Editor.

The ELDB Load Data Editor enables you to change a cut's descriptive information and interval data values, and to synthesize new cuts from existing ones. Another important application of the Editor is to delete load data records and other unwanted cuts from the ELDB after you have finished processing them. You can use the ERASE Command to perform this operation.

The kinds of changes that you can make using the ELDB Load Data Editor are primarily "cut and paste" and other direct modifications (in other words, you directly replace an old data value with a new one). Another Oracle Utilities Load Analysis program, Transformation, is available for more complex tasks — such as combining records for multiple channel numbers into a single customer record or calculating new data using arithmetic operations. Transformation is described in *Chapter 15: Performing Ad Hoc Load Calculations Using the Transformation Program (X620, Y620)*.

> The ELDB Load Data Editor is identical to the Editor used in the Load Data Management Subsystem, except that the *"AUDIT OFF" mode of operation is normally used*. This means that edit trails and inactive records of original data are not created during editing, and that *the RESTORE Command will not work*. All other commands remain the same except PRORATE and REMARK, which are also not available.

Using the Load Data Reporter to Examine Cuts

Often, you will want to look at all data in a cut before making any modifications to it. The ELDB Load Data Editor, explained later in this chapter, enables you to examine a cut's descriptive information and, optionally, its interval data expressed in demand or energy values. Each element of this type of report is explained in *Chapter 3: The Oracle Utilities Load Analysis Data Formats*. You may also use or the Display Tool to view data.

Steps for Using the ELDB Load Data Editor (Y630)

Once you have determined that you want to modify data in the ELDB, follow the steps summarized in the following box.

Summary — Using the ELDB Load Data Editor

1. Create Control File containing edit commands (TGY63A.CTL).
2. Run Load Data Editor (ELDB) Program (Y630).

Important note about the ELDB Load Data Editor

The ELDB Load Data Editor stores **only** the new, edited version of a cut. Unlike the CLDB Editor, it does **not** keep the original version or any edit trails.

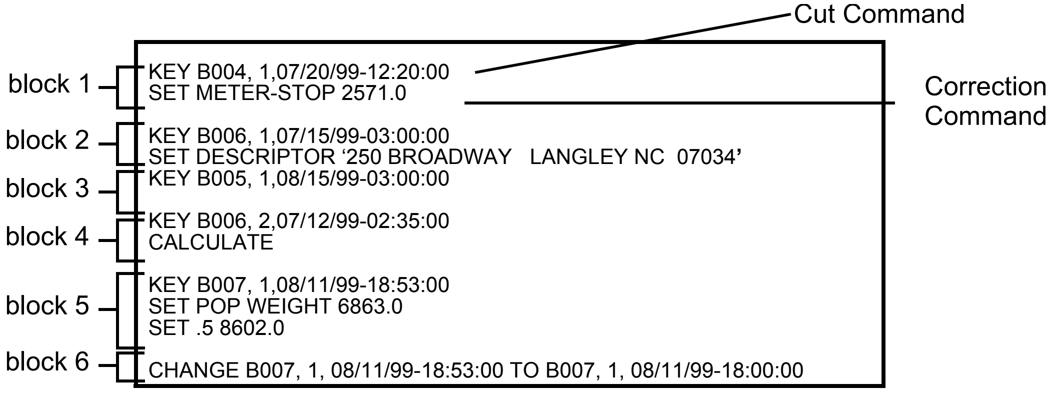
Note: The Y620 program supports pre-process key generator. See **Using the Preprocess Key Generator in a Control File** on page 4-4 for more information.

Step 1: Create the Editor Control File Containing your Edit Commands

Your first step is to create a file of edit commands using a special "edit command language." These commands enable you to change a cut's key, modify descriptive fields or interval data, or create new cuts from existing ones. Two types of commands are available:

- **Cut commands** — use these commands to modify the cut key or select a cut for further processing. Think of the Cut commands as a way of manipulating *cuts in the database.*
- **Correction commands** — use these commands to modify a cut's descriptive fields or interval data. Think of the Correction commands as a way of changing *information within a cut.*

You construct the Editor Control File (Figure 6-3: Sample Editor Control File and Figure 6-4: Another Sample Editor Control File) by building "blocks" of commands — each block is a series of commands for a single cut. For each cut, enter Cut commands first, then Correction commands. You need enter only the first three characters to indicate the command title.



```
KEY B004, 1,07/20/99-12:20:00
SET METER-STOP 2571.0

KEY B006, 1,07/15/99-03:00:00
SET DESCRIPTOR '250 BROADWAY   LANGLEY NC  07034'
KEY B005, 1,08/15/99-03:00:00

KEY B006, 2,07/12/99-02:35:00
CALCULATE

KEY B007, 1,08/11/99-18:53:00
SET POP WEIGHT 6863.0
SET .5 8602.0

CHANGE B007, 1, 08/11/99-18:53:00 TO B007, 1, 08/11/99-18:00:00
```

Figure 6-3 Sample Editor Control File

This example illustrates how the Control File is constructed of edit blocks, one block for each cut to be modified.

```
KEY  B101,  1,  07/01/99-00:00:00
MOD   07/07/99-08:59:59 VALUE 5207
MOD   07/07/99-21:59:59 VALUE 2908
MOD   07/07/99-22:59:59 VALUE 1463
MOD   07/07/99-23:59:59 VALUE 921
```

Figure 6-4 Another Sample Editor Control File

This Control File could be used to correct the outages and non-normal intervals in the cut in the report.

Important note: You must *always* precede Correction commands with the “KEY” Cut Command.

In other words, you must first identify the cut you want to modify by inputting the KEY Command, then specify the change or changes you want to make using one or more Correction commands.

ELDB Edit Command Summary

The following charts summarize the Edit Commands you can use to construct the ELDB Load Data Editor Control File. Each of these commands is described in detail in the chapter on the CLDB Load Data Editor in **Chapter 9**: **Editing Data in the CLDB Using the Load Data Editor (X310 or X320)** of the *Oracle Utilities Load Analysis Load Data Management User's Guide.*

Some commands in the CLDB Load Data Editor are not available for the ELDB — specifically, RESTORE, PRORATE, and REMARK.

6-1: Cut Commands

Command Format	**Application**	**Example**
CHAnge key1 TO key2	Changes one or more components of a cut's key. (i.e., customer-id, channel, and/or start-time) You must specify the full keys.	CHA B004, 1, 07/20/99-12:21:00 TO B004, 2, 07/20/99-12:21:00
COPy key1 TO key2	Creates a duplicate of an existing cut and assigns a new key to the duplicate. key1 = cut to be copied; key2 = new key. You must specify the full keys.	COP B004, 1, 08/20/99-12:21:00 TO B004, 2, 09/20/99-12:21:00
ERAse key	Completely erases a cut from the ELDB. You must specify the full key. USE THIS WITH CAUTION!!!	ERA B007, 1, 08/20/99-12:21:00
REStore key	Restores a cut to its original, unedited version. The edited version and any edit trails are discarded. *NOTE: This command is not available for ELDB cuts.*	RES B007, 1, 08/20/99-12:21:00

6-1: Cut Commands

Command Format	Application	Example
KEY customer-id, channel(s), start-time	Selects a cut for modification by the correction commands. You must specify the full key.	KEY B007, 1, 08/20/99-03:45:00
SPLit key AT time [NEWkey customer-id [,channel]]	Splits a cut into two cuts at a time within the data range of the original. If you specify NEWkey, creates two completely new cuts; if not, first portion of split retains original key and replaces existing cut.	SPL B007, 1, 09/20/99-03:30:00 AT 09/30/99-02:59:59 NEW B007,2

6-2: Correction Commands

Command Format	Application	Example
ADDition {*time1* | **START**}{*time2* | **STOP**} *z*	Adds a constant “z” to each interval in the specified time span.	ADD START 08/20/99-12:21:00 3
AVErage [*start* | **APPend**] [*stop* | *#ints*] [**I** | **O**] [**AW** | **AD**] [**W1** *Start* | -3] [**W2** *Stop* | 3] [**Q** [*q* | 8]] [**S** [*s* | J]]	Inserts a new period of intervals into an existing cut, or overwrites existing intervals. The intervals of data used for inserting or overwriting consist of averages computed over interval data from the cut being edited, or from another time period for the same customer-id, channel.	AVE 0 03/01/89-10:00:00 03/07/89-09:59:59 AD -4 2
CALculate	Calculates actual stop-time of a cut based on its start-time, number of recorded intervals, and intervals per hour.	CAL
DELete {*time1* | **START**} {*time2* | **STOP** | **DO** *n* }	Deletes all those intervals in a cut that fall within the specified time span.	DEL 08/20/99-12:21:00 STOP
INSert {*time1* | **APPend**} {*time2* | **DO** *n* } {**Value** *z* | **From** *key* **AT** *time3*}	Inserts intervals into a cut. You can either specify a value “z” to be added “n” times, or you can copy and paste a series of intervals from the same or another cut. Use APP to put intervals at end of cut.	INS APP D 5 V 3
INTerpolate *time1* {*time2* | **DO** *n*} [**Q** [*q* | 8]] [**S** [*s* | J]]	Estimates data in a range of intervals by linear interpolation between the intervals occurring immediately before and after the range (referred to hereafter as the “first point” and “second point”, respectively).	INT 08/20/99 - 12:21:00 D 5 Q 8 S J
MODify *time* [**Status** *s*] **Value** *z1* [*z2 z3... z29*]	Changes a sequence of pulse values to a new sequence of values “z1"... “z29" beginning at “time.” Optionally, can also change status to “s” for affected pulse values.	MOD 05/11/89-10:44:59 S 9 V 12 15 13
MULtiply {*time1* | **START**}{*time2* | **STOP**} *z*	Multiplies all pulse values that fall within the specified time span by a constant “z.”	MUL START 04/13/99-10:59:59 3

6-2: Correction Commands

Command Format	Application	Example
OVErwrite *time1* {*time2* | **DO** *n*}{**Value** *z* | **Status** *s* | **Value** *z* **Status** *s* | **From** *key* **AT** *time3*}	Overwrites intervals in a cut. You can specify a value "z" to overwrite "n" intervals, or you can copy and paste a series of intervals from the same or another cut.	OVE 05/20/99-09:51:59 D 5 V 2
PROrate STAtus [*s* | *] [**MAX** *x* | 32760] [**MIN** *n* | 0] [**MET** *ngy*]	Prorates one or more data intervals so the cut's interval energy is consistent with its meter energy. Optionally, you can specify that only status codes of a certain value "s" be prorated. You can also specify a peak value not to be exceeded, a minimum value not to be exceeded, and metered energy to override the metered energy in the cut. *NOTE: This command is not available for ELDB cuts.*	PRO J MET 2500.0
REAding *time r* [#*dials* [.#*decimals*]]	Use this command to specify a meter reading at a given time within the cut's range. The Editor will recalculate the cut's meter start and stop readings to conform to this information and the cut's total interval energy.	REA 09/24/99-14:17:00 2437
REMark [*remark*]	Add notes of up to 200 characters to an edit trail. Recommendation — record the initials of the person making the edits. *NOTE: This command is not available for ELDB cuts.*	REM CORRECTED BY JDL

SET *field value*	Manually overrides storage flags or resets descriptive fields other than cut keys, load data, or status codes. See the *Quick Reference Guide* for a full list of eligible fields.	SET ARCHIVE YES
		SET UOM 02

SMOoth [**HIGh** | **LOW**] [**Value** *z* | 0] [**DO** *n* | 1] [**Status** *s* | **K**]	Provides the user with a technique for eliminating spikes (abnormally high values) or dips (abnormally low values) in the data profile that exceed expected limits.	SMO HIGh 1000 Do 10 STA K SMO LOW 1000 Do 10 STA K
STAtus {*status-to-be-changed* | *} *new-status*	Changes all occurrences in a record of status code s1 to s2. If s1 is an asterisk (*), all status codes are changed to s2.	STA 1 L

Guidelines for Using the Edit Commands

Table 6-1 and Table 6-2 list all of the Edit Commands and summarize their applications. The notes below give you some general guidelines for constructing the commands.

1. Inputting Times

   Many of the Edit commands require you to specify a time. The two formats indicated below are always acceptable and interchangeable, although to maximize readability and minimize input errors, the first is preferable:

- mm/dd/yy-hh:mm:ss (for example, 01/23/89-00:00:00)
- mmddyyhhmmss (for example, 012389000000).

In the KEY Command, it is permissible to use just the start-date.

2. Specifying Interval Values for Modification

Many of the Correction commands enable you to change one or a series of interval values in a cut. You must identify which values you want to change by specifying parameters in the command. You can do this in a couple of ways:

- **“Time1" “Time2"** — You can identify the ending time of the first and last intervals in the series to be changed, e.g., “time1 time2”. You must input the complete date and time.
- **“START” “STOP”** — If the first interval in the group you want to change is the first interval in the cut, you can input “START” instead of typing out the time. Similarly, if the last interval in the group you want to change is the last interval in the cut, you can input “STOP”.
- **“DO n”** — You can indicate the first interval in the series (using either its ending time or START) and the number of intervals after it if you want them changed using “DO n”, where n = the number of intervals to be changed. You can enter “D” for DO.
- **“Value z”** — Identify the value to be added, etc., to each specified interval by “Value = z”, where z is the constant. You can abbreviate Value by just using the letter “V”.

3. Patching Interval Data

The INSERT, INTERPOLATE, and OVERWRITE commands enable you to copy, paste, and estimate interval data from one cut to another. You can copy a series of energy values from the same cut or any other cut in the ELDB. The intervals can even be from two contiguous cuts. If the cut being copied has a different pulse multiplier than the cut being edited, the data values will be adjusted using the edited cut’s multiplier before the values are copied. You use **“From key AT time”** and **“DO n”** to specify the intervals to be copied, where “key” is the key of the source cut, “time” is the ending time of the first interval to be copied, and n is the number of intervals to be copied. AVERAGE also does patching, but only within a cut series.

Step 2: Run the ELDB Load Data Editor Procedure (Y630)

Once you have created the Control File, you are ready to run the ELDB Load Data Editor. Use the Y630 Submit screen.

For a more detailed explanation of the Load Data Editor, please refer to the Oracle Utilities Load Analysis Load Data Management User’s Guide, Chapter 9.

Chapter 7

Expanding Load Data to Class-Level Estimates Using the Load Analysis Programs (Y310 and Y330)

Once you have input data to the Extracted Load Database and (possibly) modified it to your requirements, you are ready to begin analysis. Oracle Utilities Load Analysis offers two programs for developing strata- and class-level statistics from customer load data: Standard Load Analysis and Ratio Analysis. This chapter explains how to apply each program. Topics covered are:

- **Comparison of MPU and Ratio Analysis Methodologies**
- **Three Methods of Ratio Estimating**
- **Preparing for Analysis**
- **Steps for Using the Standard Load Analysis or Ratio Analysis Procedures (Y310 or Y330)**

Oracle Utilities Load Analysis offers a third program for computing statistics for a single analysis group — the 100% Sample Analysis Program. That program, which is described in the following chapter, is used when every member of the population is included in the analysis.

Oracle Utilities Load Analysis offers two programs for expanding customer load data to strata- and class-level estimates: **Standard Load Analysis** and **Ratio Analysis**.

These two programs are similar in *what* they do. Both programs analyze customer demand over user-defined time periods of up to four years (36,000 intervals), and apply to pre-stratified, post-stratified, and non-stratified samples. Both produce demand statistics for the entire analysis period, as well as for different types of days and times of use within the period; and they compute estimates of coincident demands, non-coincident demands, energy, load factors, and diversity factors. Both produce standard errors of the estimates indicating the accuracy of the sample. Both can write the statistics to the ELDB for further analysis, and produce an extensive array of reports. Both create a file of individual customer statistics that can be accessed by user programs for further analysis.

However, the programs differ in the methodologies they use to calculate the statistics. The Standard Load Analysis Program uses the *mean per unit* (MPU) approach, while the Ratio Analysis Program uses *ratio expansion*.

> The 100% Sample Analysis Program (Y380) can be used instead of Standard Load Analysis to compute statistics for 100% sampled populations, such as large industrials (see *Chapter 8: Computing Statistics for 100% Sampled Populations (Y380)* for instructions).

Comparison of MPU and Ratio Analysis Methodologies

Mean per unit uses the average demand for each interval, expanded by the class population to obtain an unbiased estimate of the class total load.

$$\begin{array}{c}\text{Average}\\\text{Hourly}\\\text{Demand}\end{array} \times \begin{array}{c}\text{Number of}\\\text{Customers in}\\\text{Population}\end{array} = \begin{array}{c}\text{Estimate of}\\\text{Hourly Class}\\\text{Total Demand}\end{array}$$

Ratio analysis uses the ratio of demand to billed energy for each interval, expanded by the sum of class bills to obtain class total estimates.

$$\frac{\begin{array}{c}\text{Average}\\\text{Hourly}\\\text{Demand}\end{array}}{\begin{array}{c}\text{Average}\\\text{Billed}\\\text{Energy}\end{array}} \times \begin{array}{c}\text{Total Population}\\\text{Billed Energy}\end{array} = \begin{array}{c}\text{Estimate of}\\\text{Hourly Class}\\\text{Total Demand}\end{array}$$

At one time, mean per unit was the standard for load research applications. However, ratio analysis has rapidly overtaken MPU as the standard, because it can produce more accurate, usually unbiased estimates of the class total load with lower standard errors. In addition, it can reduce the required sample size by as much as 30%. This technique does assume there is a strong correlation between demand and energy within the customer class.

Other advantages of the ratio technique are that it does not tend to vary greatly with the inclusion or exclusion of large customers, and it is less sensitive to changes in the class population. Further, because utilities typically track billing data much more closely than population, the monthly class estimates tend to be more accurate.

A disadvantage of ratio analysis is that it may produce biased estimates under certain circumstances. (Oracle Utilities Load Analysis will alert you to biased intervals.) Further, while the ratio technique produces more accurate results during peak hours, it may produce less accurate estimates during hours of low usage. (The accuracy level of the ratio approach is dependent upon the correlation of interval demand to monthly energy.)

The advantage of MPU is that it requires less data. MPU requires only sample load data and class population data by strata to produce class estimates, while the ratio approach requires additional information on monthly billing data for each customer in the sample, and the class total bill.

Three Methods of Ratio Estimating

The Ratio Analysis Program can perform three types of ratio estimation. Each technique has its own formulation and statistical assumptions for correct usage. Which technique the program applies is automatically dictated by commands you supply in the Environment File.

Non-Stratified Ratio — applies only to simple random samples with no stratification. The program automatically uses this technique when you supply a single STRATA Command in the Environment File.

Stratified Combined Ratio — most commonly used estimator for stratified random samples. It calculates a "combined ratio" across all strata and expands it by the total population billed energy. This technique produces demand estimates for the class; it *does not* produce stratum-level demand estimates.

Stratified Separate Ratio — effective methodology if the relationship of demand to energy changes significantly from one stratum to the next. It requires that you supply accurate billed energy totals for each stratum. It produces demand estimates for each stratum, and the class total.

Preparing for Analysis

Before running the Analysis programs, you will construct a "Control File" consisting of a list of customers and related data to be analyzed, and an "Environment File" specifying the analysis mode and various reporting options. Here are some useful guidelines to keep in mind when getting ready to construct these files. Each piece of information is described in more detail later in this chapter.

1. **Customer Data**

   For each customer included in the analysis, you will need to identify its stratum-number (if using stratified analysis) and its billed energy for the billing cycle(s) that correspond to the analysis period (if using any of the three types of Ratio Analysis). The stratum-number will typically come from the original sample design. The billed energy may come from "the Billing System." For example, your facility may have an interface software program that extracts the data from Billing or a Customer Master File. The customer billed energy values for a Ratio Analysis should be reviewed carefully to ensure that they are complete and correspond to the billing period covered by the analysis.

   If you cannot supply billed energy values for individual customers, the Ratio Analysis Program can calculate the energy values for the analysis period using the customers' interval data as part of the analysis job run. A better alternative, however, is to use the Billed Energy Program, Y230 (described in *Chapter 13: Computing Customer Energy Use by Billing Cycles Using the Billed Energy Program (Y230)*) to calculate energy for the appropriate billing periods. (This is explained further in Step 2 of this chapter.)

2. **Load Data**

   You can analyze any customer subset and any time period for which data exists in the ELDB.

3. **Population**

   Strata Sizes — If performing stratified analysis, you will need to specify the size of each stratum. This number typically comes from the original sample design.

   Population Billed Energy — If applying ratio analysis, you will need to input the actual value of the billed energy for the sample over the analysis period. If you know the actual billed energy for each stratum, you can perform Separate Ratio Estimation. However, if you do not have the billed energy for the sample accurately broken down by strata, you will have to use Combined Ratio Estimation.

Sample Points — It is important to remember that each entry in the Control File is a sample point. If you are analyzing end uses, it would be appropriate to keep channel-numbers separate. If you are analyzing “total premise loads,” you may want to combine the channel-numbers for a single customer. You can do that in the Analysis Control File. However, if you want to combine multiple customer-ids for a large individual customer to create a single sample point, you will have to use the Load Data Transformation Program, Y620, before analysis (described in *Chapter 15: Performing Ad Hoc Load Calculations Using the Transformation Program (X620, Y620)*).

4. **Saving Results**

   In the Analysis Environment File, Oracle Utilities Load Analysis will ask you to assign a key identifier to the analysis results. It is very important — particularly if the statistics are to be accessed by people besides yourself — that you assign a meaningful key. For example, you might assign the key “RESAC” to the results of a residential air conditioning study. You may also direct the program to write statistics back to a database designated for a specific rate code or directly into an SLDB.

Steps for Using the Standard Load Analysis or Ratio Analysis Procedures (Y310 or Y330)

Here is a brief list of the steps you will follow when analyzing load data in the Extracted Load Database, using either the Standard Load Analysis or Ratio Analysis procedures (Figure 7-1: Overview of the Standard Load Analysis and Ratio Analysis Programs). The remainder of this chapter explains these steps in detail.

> Files and reports associated with the Standard Load Analysis Program are identified by "TGY31_"; those associated with the Ratio Analysis Program are identified by "TGY33_".

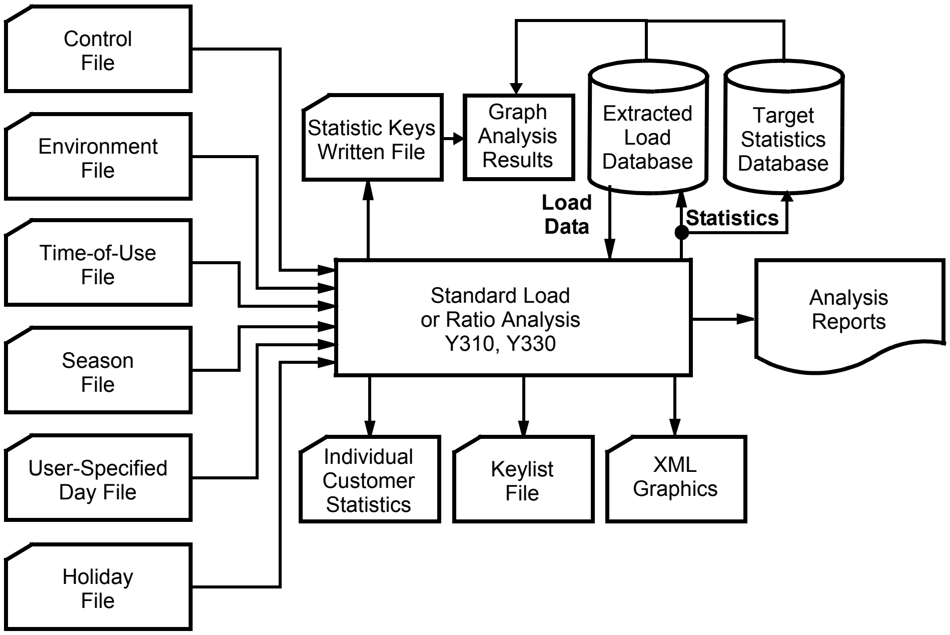


Figure 7-1 Overview of the Standard Load Analysis and Ratio Analysis Programs

Summary — Using Standard Load Analysis or Ratio Analysis

1. Make sure that customer load data for the entire analysis period is available in the ELDB.
2. Create the Analysis Control File (TGY31A.CTL or TGY33A.CTL) — a list of the customers to be analyzed and, if using fixed strata analysis, the strata to which they should be assigned.
3. Create the Analysis Environment File (TGY31B.ENV or TGY33B.ENV) — a group of commands you use to set analysis and reporting options.
4. Modify Time-of-Use File (TGY31D.TOU) if necessary.
5. Modify Season File (TGY31E.SEA) if necessary.
6. Modify User-Specified Day File (TGY31F.USD) if necessary.
7. Verify that the Holiday File (TGY31C.HOL) has been set up correctly.
8. Run the Analysis Program (Y310 for Standard Load Analysis or Y330 for Ratio Analysis).
9. Check output:

    Analysis reports

    ELDB statistics

    Individual Customer Statistics File

    Keylist File.

Step 1: Ensure that Customer Load Data for the entire Analysis Period is Available

Before running the analysis, be sure that the ELDB contains reliable load data for all customers in the analysis group over the entire analysis period. (*Chapter 5: Getting Data into the Extracted Load Database (Y130, Y220, Y240)* provides detailed instructions for getting data into the ELDB.) You may wish to run the ELDB Summary Reporter (Y440) to verify that the desired data is available.

Here are some important points to keep in mind about load data for analysis:

Time Periods — It is important to remember that you can analyze data for any customer subset and any time period for which data exists in the ELDB. You are not constrained by extraction periods. In other words, even though it may be the policy at your facility to extract data in monthly increments, you can analyze data for any time period made up of whole days without having to re-extract the data.

Frequency — If you want to analyze data at a frequency higher than what exists in the ELDB, you will have to re-extract it at the desired frequency.

Quality — The Environment File for the Analysis programs enables you to specify that customers whose data falls below user-specified levels of quality be automatically dropped from the analysis. *It is very important to monitor the effects of this automatic drop.* You do not want to drop either very large customers, or *any* customers in small samples — these customers act as “swing factors” and their absence can severely distort the results of the analysis. For such customers, you may want to go back to the load data and fix any problems.

Note: If you have any questions about the data, you may want to select the PRELIMINARY option in the Analysis Environment File. This option enables you to preview results before executing full-scale analysis and reporting.

Step 2: Create the Analysis Control File (TGY31A.CTL or TGY33A.CTL)

The Analysis Control File consists of a list of keys identifying the customers to be analyzed, and — if you are performing a fixed strata analysis — the stratum to which each customer should be assigned. If you are using the Ratio Analysis Program, it may also include actual billed energy values.

Note: The Y310 and Y330 programs supports pre-process key generator. See **Using the Preprocess Key Generator in a Control File** on page 4-4 for more information.

The Analysis Control File allows you to combine multiple channels of data for a single customer-id into a single "cut" for analysis. (However, you cannot combine channel numbers for multiple customers; you must use the Load Data Transformation Program, Y620, to do that.) There are four options for creating the Analysis Control File:

- **ELDB Key Generator Program/Query Lists** — enable you to quickly generate a list of customers that match specific criteria, based on fields in the Oracle Utilities Load Analysis Load Data Records. For example, you can create a list of all customer records that have a particular identifier code or a particular start-time. You can base your request on any field or combination of fields in the ELDB data record. See ***Chapter 14: Key Generators — Shortcuts for Creating Input Files and Reports*** for an explanation of how to use this program.
- **Customer Data Extraction (CDE) Program** — enables you to quickly generate a list of customers that match specific criteria, based on fields in the user-defined Customer Attribute File. For example, you could create a list of all customers that are in a given geographic area or have a particular SIC code. See ***Chapter 14: Key Generators — Shortcuts for Creating Input Files and Reports*** for more information.
- **Billed Energy Program** — enables you to create a Control File that includes customer energy values by billing cycle. This is very useful if you are unable to get billed energy values from "books and records." The Billed Energy Program calculates the energy values from interval data stored in the LODEVIEW database. See the Billed Energy Program documentation in ***Chapter 14: Key Generators — Shortcuts for Creating Input Files and Reports*** for more information.
- **Manually** — you can type the file.

No matter which approach you use, the file must be constructed of a series of control records using the format specified below, with one record for each sample point. You may input blank spaces or commas between elements in the command record, with the exception that blanks are not allowed before or after an operator if combining channels.

Control File Record Format for Standard Load Analysis:

customer-id chan1 [{±}*chan2* [{±}*chan3*...[{±}*chann*]]] [*stratum-number* | 1]

Control File Record Format for Ration Load Analysis:

customer-id chan1 [{±}*chan2* [{±}*chan3*...[{±}*chann*]]] [*stratum-number* | 1] [*billed-energy*]

- **customer-id** — (required) enter the Oracle Utilities Load Analysis customer-id.
- **chan1, chan2...chanx** — (required) enter the channel-number or a combination of channels for that customer-id. A combination consists of two or more channels added or subtracted to represent the total customer load (e.g., 1+2-7 is the sum of channels 1 and 2, minus channel 7, a co-generation unit). Do not add blanks before or after an operator. The data is combined strictly for the analysis; no new records are created. ***Note: At least one channel-number is required per record***.
- **stratum-number** — enter the fixed stratum number to which the customer belongs (if you are performing a fixed strata analysis).

- **billed-energy** — ***for Ratio Analysis only*** — the amount of energy for which the customer was billed corresponding to the analysis period. Enter the value as a positive floating point number. This energy should come from "Billing," or be calculated before analysis using Oracle Utilities Load Analysis's Billed Energy Program, and should represent a billing cycle. If you cannot provide accurate billed energy values for each and every customer in the Control File, you can have Oracle Utilities Load Analysis calculate the values from the interval data. Simply leave off all billed-energy values from the Control File records, but be sure to specify BILL NO in the Environment File (explained later in this chapter).

  Figure 7-2: Sample Standard Load Analysis Control File for a Fixed Strata Analysis and Figure 7-3: Sample Ratio Analysis Control File for a Fixed Strata Analysis are sample Analysis Control Files.

```
A7301   1,          1     /* KEYS FOR STANDARD LOAD ANALYSIS
B7308   2,          2
B7311   1,          1
B7312   1+2,        2     /* ADD CHANNELS 1 AND 2
B7393   1+2,        2
B7397   1,          1
C7378   1,          1
D7316   1+2,        3
E7333   2 –1,       2     /* SUBTRACT CHANNEL 1 FROM CHANNEL 2
E7336   2 –1,       1
F7338   1+2,        3
G7339   1+2+3,      2
G7342   1+2+3,      2
G7480   3 –2 –1,    3
L7353   1,          1
```

Figure 7-2 Sample Standard Load Analysis Control File for a Fixed Strata Analysis

```
A7301   1,    1   200  /* KEYS FOR RATIO ANALYSIS
B7308   2,    2   400
B7311   1,    1   150
B7312   1+2, 2    350  /* ADD CHANNELS 1 AND 2
B7393   1+2, 2    300
B7397   1,    1   175
C7378   1,    1   125
D7316   1+2, 3    650
E7333   2 –1,2    300  /* SUBTRACT CHANNEL 1 FROM CHANNEL 2
E7336   2 –1,1    110
```

Figure 7-3 Sample Ratio Analysis Control File for a Fixed Strata Analysis

Step 3: Create the Analysis Environment File (TGY31B.ENV or TGY33B.ENV)

You use the Analysis Environment File to specify the conditions under which you want the analysis to be performed and reported.

The file is made up of the commands summarized below. When creating the file, enter one command per line. Each line must begin with the command name (keyword); but you need enter only the first three letters of the keyword. You may enter the commands in any order. If you do not specify a value or parameter for a command, the program will assume the default (underlined). Following is a detailed description of each command.

DATe *start-date stop-date*

AGGregate [*n* | <u>3600</u>]

ROLling *n* [‘*q*’ | ‘8’]

QUAlity [‘*q*’ | ‘8’]

DROp [*d*% | 100%]

PROrate [**YES** | **NO**]

BILling [**YES** | **NO**]

ASSign [**FIXed** [*comment* | **KWH**] | **FLOat** [**LF** | **KW** | **KWH**]]

STRata [*stratum-number* | 1 [*strata-billed-energy* [*boundary* | **INFinity** [*population* | 0 [weight | 0-0]]]]]

TOTalpopulation *n*

COMbined *total-population-billed-energy*

SCHedule [*t* | 0] [,**NOPrint** | ,**PRInt**]

SEAson [*s* | 0] [,**NOPrint** | ,**PRInt**]

PEAk *peak-time*

GRA

GROup *title*

ICS [**CHAracter** | **BINary**]

REPort [**PREliminary** | **NOStrata** | **NOEvaluation** | **COMplete]**
[**AVErage**][**PEAk**][**MINimum**][**CD**][**MCD**][**NCD**][**ENErgy**]
[**FACtor**][**DAIly**][**ICS**][**ENTire**][**PREcision**][**STRatum**]

KEY [*key* | **STAR**]

WRIte [**NO** | **NOStrata** | **COMplete**]
[**AVErage**][**PEAk**][**MINimum**][**CD**][**MCD**][**NCD**][**ENErgy**] [**FACtor**][**ENTire**]

ALPha [5% | 10%]

MINinum [0 | **ZERo** | **NONZero**]

DATe *start-date stop-date*

- **Date** — A required command that you use to establish the analysis period. Dates may be specified in the form “mm/dd/yy” or “mm/dd/yy-hh:mm:ss”. If the hour, minute, and second fields are omitted, 00:00:00 will be assumed for start-dates and 23:59:59 will be assumed for stop-dates.

  You can select any date range for which data exists in the Extracted Load Database, with the following constraints:

  > The duration of the analysis period must always be a multiple of 24 hours. Some examples of valid analysis periods are 05/01/98-09:00:00 through 06/01/98-08:59:59, and 05/01/98-00:00:00 through 05/31/98-23:59:59. Note that the duration of each of these date ranges is exactly 31 days.
  >
  > **Note:** All data found within any particular 24-hour period will be treated as if it occurs on the day in which that period starts - the “sendout day”. For example, if the specified date range is 05/01/98-09:00:00 through 05/31/98-08:59:59, all intervals occurring between 05/01/98-09:00:00 and 05/02/98-08:59:59 will be

reported as if they occur on 05/01/98. The maximum number of intervals that can be included in a single analysis run is 36,000.

AGGregate [*n* | 3600]

- **Aggregate** — Input “n” to establish the number of seconds-per-interval for the analysis data; 300, 900, 1800, 3600, and 86400 are permitted values. 3600 is the default.

  Where possible, Oracle Utilities Load Analysis will sum each customer’s load data to the specified level.

  Note: If AGG 86400 is coded, the SCHedule, SEAson, and ROLling commands should not be used.

ROLling *n* [‘*q*’ | ‘8’]

- **Rolling** — An optional command that enables you to report the analysis results in a rolling format. That is, each interval of the analysis period is an average of a number of preceding interval values and the current interval itself.

  The rolling command consists of two parameters — “n” to specify the level of aggregation for use in computing the rolled interval, and “q” to set the level of acceptable data quality for the averaging.

  The value for “n” must be greater than, and a multiple of, the analysis data’s interval length. The default value is “3600”. The program will average the analysis data at the level set by “n”. For example, if the original analysis data has a level of aggregation of 900 seconds-per-interval and you set “n” to 3600, then each output interval will be the average of itself and the three preceding 900-second interval values.

  For “q”, input the status code for the minimum data quality you want included in the averaging. Any intervals that are missing or have status codes worse than “q” will be excluded from the averaging. The status code **must** be input with apostrophes (’) on either side. The default is ‘8’ (only missing intervals are excluded).

  Oracle Utilities Load Analysis sets the status code of an output interval to the worst of the input status codes. However, if an input interval was missing or excluded, the output status code can be no better than ‘5’. ***Note:*** You can find a list of Oracle Utilities status codes in *Chapter 3: The Oracle Utilities Load Analysis Data Formats*, or in the *Oracle Utilities Load Analysis Quick Reference Guide*.

QUAlity [‘*q*’ | ‘8’]

- **Quality** — Use this command to set the level of acceptable data quality for the analysis. Input the worst acceptable status code. Oracle Utilities Load Analysis will treat any interval with a status code worse than “q” as missing. ***Note:*** The status code must be input with apostrophes (’) on either side. The default is ‘8’ (only missing intervals are excluded).

DROp [*d*% | 100%]

- **Drop** — This command establishes the threshold for dropping customers due to missing or excluded data. If a customer is missing d% or more of the total expected intervals in the analysis period (due to missing data or data excluded by the Quality Command), Oracle Utilities Load Analysis will drop the customer from the analysis.

  Note: This command is superseded by the requirement that each customer have at least one non-missing interval in each Time-of-Use period.

The value for “d” must be a non-negative integer between 0 and 100, inclusive. The percent symbol (%) is optional. The default is “100”.

PROrate [**YES** | **<u>NO</u>**]

- **Prorate** — Use this command to specify whether or not total energy values for each customer should be adjusted to compensate for missing data. Application of the Prorate Command affects any calculations based on energy, including floating stratification assignments, load factors, etc. However, it does **not** fill in missing demand values.

  If you input “PRO YES”, each customer’s total energy value will be multiplied by the ratio of expected intervals to actual intervals within each Time-of-Use period. If you input “PRO NO”, Oracle Utilities Load Analysis will make no adjustments for missing or excluded data. NO is the default.

BILling [**YES** | **<u>NO</u>**]

- **Billing — *for Ratio Analysis only* —** This command enables you to specify the energy values for individual sample customers that Oracle Utilities Load Analysis will use to compute the ratio denominator of the ratio estimate. If you specify “YES”, Oracle Utilities Load Analysis will use the billed-energy values you supplied in the Control File. If you specify “NO”, the Ratio Analysis Program will automatically calculate energy values for each customer-id for the analysis period specified in the Date Command from interval data in the ELDB. “NO” is the default. “BILLING YES” must be specified to produce the Billed Energy Summary Report (TGY331-35).

  > **Note:** If you input “YES”, you **must** supply the actual billed energy for each customer in the Control File.

ASSign [**<u>FIXed</u>** [*comment* | **<u>KWH</u>**] | **FLOat** [**LF** | **KW** | **<u>KWH</u>**]]

- **Assign** — Use this command if you are performing stratified analysis. It specifies the method Oracle Utilities Load Analysis will use to assign customers to strata — either “floating” or “fixed”. With floating, the program will put each customer in a stratum according to criteria you define in this command. With fixed, the program follows the strata assignments identified in the Analysis Control File.

  Select “FLOAT” if you are performing a post-stratified analysis. Indicate whether you want Oracle Utilities Load Analysis to assign customers to strata based on load factor (“LF”), non-coincident demand (“KW”), or energy (“KWH”). KWH is the default for floating assignments. The strata boundaries are determined from the STRATA Command (explained below).

  Select “FIXED” if you are performing a pre-stratified or non-stratified analysis. If pre-stratified, Oracle Utilities Load Analysis will assign customers to strata according to the stratum-numbers in the Analysis Control File. If desired, use the “Comment” field to note the criteria that were used for the fixed stratification assignments. Input up to 12 characters, with no intervening blanks. The default is “KWH” (this is simply a comment; it does not affect processing).

  The default for the command is “ASSIGN FIXED KWH”.

STRata [*stratum-number* | <u>1</u> [*strata-billed-energy* [*boundary* | **<u>INFinity</u>** [*population* | <u>0</u> [weight | <u>0-0</u>]]]]]

- **Strata** — How you set up the Strata Command(s) largely determines what kind of analysis the program performs. Generally, you will supply one Strata Command for each stratum in a stratified analysis. If you supply just one Strata Command in the file, the program will perform a non-stratified analysis. If you leave out the command altogether, the program will perform the default: non-stratified analysis of a 100% sampled population.

Parameters you supply within the command further influence the type of analysis, as explained below and illustrated later in this section (see Figure 7-4: Sample Environment File for a Stratified Standard Load Analysis through Figure 7-8: Sample Ratio Analysis Environment File for a Non-Stratified Analysis).

Input one command (line) for each stratum in the analysis. **Up to 99 strata may be defined.** The following explains each parameter in the command:

stratum-number — Identifies the stratum. It must be a positive integer from 1 to 99. Within the file, stratum numbers must appear in ascending order, but need not necessarily be consecutive.

stratum-billed-energy — *For Ratio Analysis only.* Defines which total billed energy value(s) for the population are to be used in the ratio expansion.

> **Note:** If you can supply accurate billed energy for each stratum, the program will perform Separate Ratio Estimation-producing demand estimates for each stratum, as well as the class total. Typically, however, only the total billed energy for the entire population is available. In that case, you can perform Combined Ratio Estimation, which produces demand estimates for just the class, as explained below.
>
> **For Stratified Separate Ratio Estimation:** Input the actual total billed energy for the stratum population as a positive floating point number. Stratum-billed-energy is *required* for separate ratio estimation even if you set the Billing Option to NO (see the Billing Command, later in this section).
>
> **For Stratified Combined Ratio Estimation:** You **must** input zero (0) or another value as a placeholder for stratum-billed-energy. The value will not be used in the calculations. You will need to use the COMBINED Command, described later in this section, to specify the total billed energy for the population.
>
> **For Non-Stratified Ratio Estimation:** You **must** provide the actual total billed energy for the population as a positive floating point number. This is required even if the Billing Option is set to NO (see the Billing Command, later in this section).

boundary — Defines the upper boundary of the stratum.

> **For a post-stratified analysis** — If you specified FLOAT in the ASSIGN Command, you must use this parameter to define the upper boundary of the stratum. The value must be a positive floating point number. Within the file, boundaries for each stratum must appear in ascending order. Specify "INFinity" as the boundary for the last stratum.
>
> **For a pre-stratified or non-stratified analysis** — If you specified FIXED in the ASSIGN Command or are performing a non-stratified analysis, you may use this position in the command for comments. Your comments can consist of up to 12 characters with no intervening blanks.

population — the size of the stratum population, or the entire population if performing a non-stratified analysis. If you input "0" or omit the parameter, Oracle Utilities Load Analysis will assume that the population equals the stratum sample size (100% sampling).

weight — optional weighting factor for the stratum. Your input must be a floating point number between zero and one. If you input zero (0.0) or do not supply a weight, Oracle Utilities Load Analysis will assign a weight based on the stratum population.

> **Note:** The strata boundaries, population, and weight typically come from the original sample design criteria.

TOTalpopulation *n*

- **Totalpopulation:** When this command is supplied, if any integers have been assigned in the strata population command, the TOTalpopulation calculations will override the user-supplied values. The value of n must be a non-negative integer.

  When this happens, that line of the environment file report will be flagged with an asterisk and a legend will appear at the bottom of the report that will read:

  “*The supplied strata population has been overridden by the TOTalpopulation command.”

  When the TOT command is in effect, the title of the POPULATION column in the environment report is changed to “CALCULATED POPULATION”.

  When using the TOT command, the user must include a place holder of zero (0) for the strata populations to avoid the override messages in the environment report.

  If both the strata populations and the strata weights are omitted from the strata commands, and the TOT command is present and valid, the system will equally allocate the total population supplied across the stratas and indicate this in the environment report.

  When the user supplies a TOT value in the Environment file, and the strata populations but omits the weights, the program assigns weights as documented and then adjusts the strata populations according to the assigned weights.

  The strata populations are calculated using the following formula. The Class Population is supplied via the new TOT n environment file command.

  Strata Population = Class Population * Strata weight.

COMbined *total-population-billed-energy*

- **Combined:** — for ***Stratified Combined Ratio Analysis only*** — use this command to supply the actual total billed energy for the entire population (instead of using the STRATA Command’s stratum-billed-energy option to allocate the population billed energy across individual strata). Input the value as a positive floating point number.

  When you supply this command, the program automatically performs Combined Ratio Expansion, and reporting is restricted to the corresponding combined reports.

SCHedule [*t* | 0] [,**NOPrint** | ,**PRInt**]

- **Schedule** — Use this command to select a single schedule from the Time-of-Use File (TGY31D) for the time-of-use calculations. The parameter “t” is a non-negative integer representing a particular schedule in your TOU file. The default, “SCHEDULE 0”, automatically defines a single time-of-use period equal to the analysis period.

  Use the PRINT option if you want to print graphs of the time-of-use periods as part of the Analysis Environment Report; use the NOPRINT option if you do not want a hard copy of the graphs. The default is PRINT, except for SCHEDULE 0, for which the default is NOPRINT.

  > **Note:** Instructions for modifying or adding new schedules to the Time-of-Use File are provided in Step 4. It is very important to keep in mind that any schedule you select must cover the entire analysis period. If the program encounters a gap, it stops processing.

SEAson [*s* | 0] [,**NOPrint** | ,**PRInt**]

- **Season** — Use this command to select a schedule from the Season Schedule File (TGY31E.SEA). Specifying a season schedule makes it possible to apply different time-of-use schedules to different portions of the analysis period.

The parameter "s" is a non-negative integer representing a particular season schedule within the Season Schedule File (defined in Step 5 of this chapter). The default, "SEASON 0", indicates that a single time-of-use schedule, as specified in the SCHEDULE Command, is to be applied over the entire analysis period.

The PRINT option indicates that graphs of time-of-use periods are to be printed with the Analysis Environment Report; the NOPRINT option suppresses the printing of these graphs. The default is PRINT.

> **Note:** Either the Season Command or the Schedule Command may be used to define time-of-use periods for analysis processing, but not both. If you include both commands in the Environment File, the program will use the Season Command and disregard the Schedule Command. If you include neither command, the default is "SCHEDULE 0, NOPRINT".

About the Season File: Instructions for modifying or adding new schedules to the Season Schedule File are provided in Step 5. It is very important to keep in mind that any Season Schedule you select must cover the entire analysis period. If the program encounters a gap, it will abort processing and issue an error message.

PEAk *peak-time*

- **Peak** — This command enables you to specify the date and time of peaks of interest that are not automatically computed by Oracle Utilities Load Analysis — such as system peak. Oracle Utilities Load Analysis will compute statistics for the entire day in which each supplied peak falls.

  You must use the format "mm/dd/yy-hh:mm:ss" to specify the peak. You can input up to 25 peaks for a Standard Load Analysis, or up to 23 for a Ratio. Input one peak per line. The default is no peaks.

GRA

- **GRA** - This command determines that graphics files are produced when running this program. In addition to the SYSGRAPH.HTM file, this command produces SYSGRAPH_STR.HTM files (SYSGRAPH_STR1, SYSGRAPH_STR2, and so on) that allow users to view graphs for each stratum defined in the job run.

GROup *title*

- **Group** — Use the Group Command to assign a title to appear at the top of each analysis report produced at the end of the program run. You can input one or two group commands (one per line), for one or two titles at the top of the reports. Each title is limited to 76 characters. If you omit the command, no title will be printed.

ICS [**CHAracter** | **<u>BINary</u>**]

- **ICS** — This command establishes the format for numbers written in the Individual Customer Statistics File (a file containing basic load statistics for each customer in the analysis).

  Select "CHARACTER" to write numbers in "picture" format, that is, numbers and characters that can be easily interpreted by the user. This option should be used in normal circumstances.

  Select "BINARY" to write numbers in binary format, that is, a compressed format that cannot be read easily by the user. Numbers that are written in binary format can be readily interpreted by computer programs, and require less storage space. Binary format numbers are equivalent to PL/1 Float Binary or COBOL COMP1 formats.

Note: The binary format of this file will be depreciated in future releases.

The default for the command is "ICS BINARY".

The record formats for both types of files are shown in *Appendix E: Individual Customer Statistics File Formats*.

REPort [**PREliminary** | **NOStrata** | **NOEvaluation** | **COMplete**]
[**AVErage**][**PEAk**][**MINimum**][**CD**][**MCD**][**NCD**][**ENErgy**]
[**FACtor**][**DAIly**][**ICS**][**ENTire**][**PREcision**][**STRatum**]

- **Report** — Use the primary options of this command to specify which groups of statistics Oracle Utilities Load Analysis should calculate and report, and use the secondary options if you wish to print only selected reports.

  PREliminary — When you select this option, Oracle Utilities Load Analysis produces the Analysis Environment and Individual Customer Statistics reports. This option enables you to preview the analysis results on a customer basis before incurring the overhead associated with a complete analysis.

  NOStrata — This option produces all report types, but does not report the information on individual strata usually included in the Sample Evaluation reports, nor does it produce strata level duration statistics. This option is useful when class totals are needed for each interval of the analysis period, but none of the strata detail. This option does not affect the reporting of the major statistics, which still include results broken down by strata.

  NOEvaluation — This option suppresses the printing of all components of the Sample Evaluation reports. Because these reports tend to be very lengthy, this option can substantially reduce the size of the hard copy output. Use this option when you want only the major statistics and analysis environment reports.

  COMplete — Select this option to calculate all statistics and print *all* reports. This option also produces complete load duration statistics. REPORT COMPLETE is the default.

  Use the secondary options if you wish to print only selected reports. The program will still calculate all statistics based on your input for the primary options, but only the specified report(s) will be printed based on the secondary options. For example, if you want to calculate all statistics but print only the Energy Report and Individual Customer Statistics Report, use this command: "REP COM ENE ICS".

  Note: Report identifiers TGY31X-XX refer to Standard Load Analysis reports; TGY33X-XX to Ratio.

  AVErage — prints all average day type evaluation reports: TGY310-08 through TGY310-20 or TGY330-08 through TGY330-23.

  PEAk — prints all peak day and supplied peak evaluation reports: TGY310-24-2X or TGY330-24.

  MINimum — prints all minimum day reports: TGY310-2X or TGY330-2X.

  CD — prints the Maximum Coincident Demand Report: TGY311-10 or TGY331-10.

  MCD — prints the Minimum Coincident Demand Report: TGY311-15 or TGY331-15.

  NCD — prints the Noncoincident Demand Report: TGY311-20 or TGY331-20.

  ENErgy — prints the Energy Report: TGY311-30 or TGY331-30.

  FACtor — prints the Load Factor, Diversity Factor, and Coincidence Factor reports: TGY311-40, 50, 60, 70 or TGY331-50, 60, 70.

DAIly — prints Daily Maximum, Minimum, and Average Demand Report: TGY310-31 or TGY330-31.

ICS — prints the Individual Customer Statistics Report: TGY311-90 or TGY331-90.

ENTire — prints the Entire Period Sample Evaluation Report: TGY310-03 or TGY330-03.

CMB — *for Ratio Analysis only* — prints the combined ratio estimation reports.

BILling — *for Ratio Analysis only* — prints the Billed Energy Summary Report (TGY331-35) if "BILLING YES" is specified in the Environment File.

PREcision — prints the Daily Maximum, Minimum, and Average Precision Report.

STRatum — *for Mean-Per-Unit Analysis only* — prints the Stratum Average Demands at Time of Group Peak Report: TGY311-85.

KEY [*key* | **STAR**]

- **Key** — Use the Key Command to assign an identifier to each of the statistics produced by the analysis run. This identifier becomes the prefix in the statistics name (see **Statistics Identifiers** on page 3-8).

  You can use up to 40 characters. A combination of characters (A - Z) and digits (0 - 9) may be used, but special characters (anything that is not a letter or number) are *not* allowed. The identifier **must** start with an alphabetic character. The default key is "STAR".

WRIte [**NO** | **NOStrata** | **COMplete**]
[**AVErage**][**PEAk**][**MINimum**][**CD**][**MCD**][**NCD**][**ENErgy**] [**FACtor**][**ENTire**]

- **Write** — Use this command to determine which statistics, if any, should be written back to the ELDB.

  NO — No statistical records are written back to the ELDB, even if you specify any of the secondary WRITE options. Use this option when you need just the hard copy output reports.

  NOStrata — Individual strata information for the major statistic reports are written to the ELDB, but individual strata statistics in the Sample Evaluation reports and individual strata level duration statistics are not.

  COMplete — Writes all statistical records produced by the analysis run back to the ELDB. This is the default.

  Use the secondary options in conjunction with the NOSTRATA or COMPLETE options to write only selected statistics. The program will still calculate all the statistics based on your input for the primary options, but only the specified statistics will be written to the ELDB.

  AVErage — writes all average day type statistics such as average weekday.

  PEAk — writes all statistics for peak day and user-supplied peak days.

  MINimum — writes all minimum day statistics.

  CD — writes Maximum Coincident Demand statistics.

  MCD — writes Minimum Coincident Demand statistics.

  NCD — writes Maximum Noncoincident Demand statistics.

  ENErgy — writes Energy statistics.

  FACtor — writes statistics corresponding to Load, Diversity, and Coincidence factors.

ENTire — writes Entire Period statistics.

CMB — *for Ratio Analysis only* — writes the combined ratio estimates of demand.

The GUI will handle all necessary program preparation. No Environment File command is necessary. If you would like the statistics to be written to an alternate database, then simply choose the database from the pull-down box. If you would like the statistics to be written to the same database, choose NONE as the target database.

ALPha [5% | 10%]

- **Alpha** — This command enables you to set the significance level for t-statistics used in the computation of relative precision. The significance level may be either 5% or 10%; the default is 10%. The percent sign (%) is optional.

MINinum [0 | **ZERo** | **NONZero**]

- **MINimum** — This command enables you to determine if the Daily Maximum, Minimum, and Average Demands Report (TGY310-29 or TGY330-29) will process zero-values as minimums or ignore them as missing. If “0” or “ZERO” is specified, zero-values will be shown as minimums. This might be appropriate if, for example, the analysis is on street lighting data, because streetlights are known to have periods of zero demand on a daily basis. “NONZERO” is the default.

Following are a few examples of Analysis Environment files. Figure 7-4: Sample Environment File for a Stratified Standard Load Analysis, Figure 7-5: Sample Standard Load Analysis Environment File for a Non-Stratified Analysis, and Figure 7-6: Sample Standard Load Analysis Environment File for a Stratified, Self-Weighing Analysis illustrate files for use with the Standard Load Analysis Procedure (TGY31B for Y310); files in Figure 7-7: Sample Ratio Analysis Environment File and Figure 7-8: Sample Ratio Analysis Environment File for a Non-Stratified Analysis are for the Ratio Analysis Procedure (TGY33B for Y330).

```
AGGREGATE  1800
ALPHA      5%                 /* 5% SIGNIFICANCE FOR T-STATISTICS
ASSIGN     FLOAT KWH          /* POST-STRATIFIED ANALYSIS ON KWH
DATE       11/01/97  11/30/97
DROP       10%                /* DROP CUST IF 10% OR MORE MISSING
GROUP      RESIDENTIAL RATE CLASS WITH ELECTRIC HOTWATER
KEY        ELHW
PEAK       11/02/97—13:59:59
PEAK       11/21/97—17:59:59
PRORATE    YES
QUALITY    ‘L’                /* ACCEPT QUALITY “L” OR BETTER
REPORT     COMPLETE AVERAGE PEAK ENERGY
ROLLING    3600‘L’            /* ROLL AT 3600 SPI AGG IF ≤ QUAL “L”
SCHEDULE   2
STRATA     1,350.0, 10400     /* STRATA, BOUNDARY, POPULATION
STRATA     2,600.0, 32790
STRATA     3, INF, 8370
WRITE      NOSTRATA PEAK
```

Figure 7-4 Sample Environment File for a Stratified Standard Load Analysis

```
AGGREGATE  900
ALPHA      10%                /* 10% SIGNIFICANCE FOR T-STATISTICS
DATE       01/15/98  02/15/98
DROP       20%                /* DROP CUST IF 20% OR MORE MISSING
GROUP      SIC CODE 30 (NON-STRATIFIED)
KEY        IC30
PEAK       01/23/98—12:29:59
PRORATE    NO
QUALITY    ‘L’                /* ACCEPT QUALITY “L” OR BETTER
REPORT     PRELIMINARY
SCHEDULE   1                  /* USE TIME-OF-USE SCHEDULE 1
STRATA     1, INF, 25732      /* STRATA, BOUNDARY, POPULATION
WRITE      NO                 /* DON’T WRITE TO ELDB
```

Figure 7-5 Sample Standard Load Analysis Environment File for a Non-Stratified Analysis

```
AGGREGATE  3600
ALPHA      10%                 /* 10% SIGNIFICANCE FOR T-STATISTICS
ASSIGN     FLOAT KW            /* POST-STRATIFIED ANALYSIS ON KW
DATE       11/01/97  12/31/97
DROP       15%                 /* DROP CUST IF 15% OR MORE MISSING
GROUP      RESIDENTIAL RATE CLASS (SELF-WEIGHTED)
KEY        RRCL
PRORATE    YES
QUALITY    ‘ ’                 /* ACCEPT QUALITY “ ” OR BETTER
REPORT     COMPLETE
ROLLING    3600‘L’             /* ROLL AT 3600 SPI AGG IF ≤ QUAL “L”
SCHEDULE   0                   /* ENTIRE ANALYSIS PERIOD
STRATA     1, 10.0             /* STRATA, BOUNDARY;
STRATA     2, 20.0             /* POPULATION FROM STRATUM
STRATA     3, 40.0             /* SAMPLE SIZE AND WEIGHT
STRATA     4, INF              /* FROM ASSIGNED POPULATION
WRITE      COMPLETE
```

Figure 7-6 Sample Standard Load Analysis Environment File for a Stratified, Self-Weighing Analysis

```
AGGREGATE  900
ALPHA      10%                    /* 10% SIGNIFICANCE FOR T-STATISTICS
ASSIGN     FIXED KWH              /* PRE-STRATIFIED ANALYSIS ON KWH
BILLING    YES
DATE       03/01/98  03/31/98
DROP       20%                    /* DROP CUST IF 20% OR MORE MISSING
GROUP      COMMERCIAL RATE CLASS  — APARTMENT BUILDINGS
KEY        CC1A
PEAK       03/10/98 —07:59:59
PEAK       03/14/98 —08:29:59
PEAK       03/25/98 —17:59:59
PRORATE    YES
QUALITY    ‘ L’                   /* ACCEPT QUALITY “L ” OR BETTER
REPORT     NOSTRATA CMB AVERAGE ENERGY
ROLLING    3600‘L’                /* ROLL AT 3600 SPI AGG IF ≤ QUAL “L”
SCHEDULE   1                      /* USE TIME-OF-USE SCHEDULE 1
STRATA     1 190000 2000 1500     /* STRATA, BILLED NRGY, BOUND, POP
STRATA     2 420000 4000 1250
STRATA     3, 1000000 INF 1000
WRITE      NOSTRATA
```

Figure 7-7 Sample Ratio Analysis Environment File

```
AGGREGATE  3600
ALPHA      10%                    /* 10% SIGNIFICANCE FOR T-STA-
TISTICS
BILLING    NO
DATE       01/01/98  01/31/98
DROP       10%                    /* DROP CUST IF 10% OR MORE
MISSING
GROUP      RESIDENTIAL-ALL-ELECTRIC RATE
KEY        RAER
PEAK       01/22/98 —17:29:59
PEAK       01/29/98 —08:59:59
PRORATE    YES
QUALITY    ‘8’                    /* ACCEPT QUALITY “8" OR BETTER
REPORT     COMPLETE
SCHEDULE   2   /* USE TIME-OF-USE SCHEDULE 2
STRATA     15000 INF              /* STRATA, BILLED ENERGY,
BOUNDARY
WRITE      COMPLETE
```

Figure 7-8 Sample Ratio Analysis Environment File for a Non-Stratified Analysis

Step 4: Modify the Time-of-Use File (TGY31D.TOU) if necessary

The Time-Of-Use (TOU) File is a required input for the analysis program. It specifies the TOU Schedule(s) to use for the analysis run.

A TOU Schedule classifies each hour in a week as on-peak, off-peak, or shoulder. Depending upon how you set up the Analysis Environment File, Oracle Utilities Load Analysis will produce statistics for up to nine different TOU schedules in one analysis run.

Typically, the TOU File is set up when your Oracle Utilities Load Analysis system is installed. For your analyses, you may wish to run the data against new TOU schedules or simply use those that already exist. In either case, you need to be aware of how the file is constructed. You may select local versions of these files, located in your Data directory. Selecting "Default" instructs the program to use the default versions set up by your Oracle Utilities Load Analysis administrator.

> **WARNING:** The Time-Of-Use Schedule File is utilized by many of the Oracle Utilities Load Analysis programs, and therefore by other Oracle Utilities Load Analysis users at your facility. For that reason, do not modify this file without careful consideration, and the knowledge of anyone else who might use the file.

Up to nine different TOU schedules can be put in the TOU File, and each schedule is limited to nine periods. Each TOU Schedule *must* classify every hour of every day in the week and holidays. There can be no overlaps or gaps between periods.

When constructing the TOU Schedule File, you define each period with a single record, using the following format. You must follow the defined order and separate each parameter with one or more blanks. Blank lines may be placed anywhere in the file.

```
sch# period day-list time-range [comment]
```

- **Schedule** — Enter a number to identify the TOU Schedule you are creating. The first schedule you enter in the file must be assigned a "1", and all succeeding schedules must be numbered consecutively. There is no set code to indicate schedule type, but the schedule numbers must be in order. There can be up to nine different schedules in the file.
- **Period** — Enter a number to identify the period you are defining in the record. The first period you enter in the schedule must be assigned a "1", and all succeeding periods in the schedule must be numbered consecutively. There is no set code to indicate period type. There can be up to nine periods in each schedule. It is important that you assign the same period number for the same period type across different TOU schedules. This will prevent problems if the TOUs are to be tied together by a season. For example, if Period 1 is designated as ON PEAK, then Period 1 should be used as ON PEAK periods for all schedules.
- **Day-list** — Enter a number to identify each day of the week to which the period applies. You must use the following codes:

1	– Sunday
2	– Monday
3	– Tuesday
4	– Wednesday
5	– Thursday
6	– Friday
7	– Saturday
8	– Holiday.

You can enter from one to eight day codes in a record. *Separate your entries by commas only — blanks are not allowed.* You must enter the codes in ascending order.

- **Time-range** — Enter the hour, minute, and second when the period begins, and the hour, minute, and second when the period ends, using the format hh:mm:ss. Remember: 24:00:00 is not allowed in Oracle Utilities Load Analysis. Note also: this range must not cross over midnight.

- **Comments** — Optional. Enter notes for your reference. The comments are printed in headings on the Time-of-Use graph.

Figure 7-9: Sample Time-Of-Use File is a sample TOU File.

```
1   1   2,3,4,5,6        08:00:00  20:59:59     ON PEAK
1   2   2,3,4,5,6        00:00:00  07:59:59     OFF PEAK
1   2   2,3,4,5,6        21:00:00  23:59:59     OFF PEAK
1   2   1,7,8            00:00:00  23:59:59     OFF PEAK

2   1   2,3,4,5,6        12:00:00  19:59:59     ON PEAK
2   2   2,3,4,5,6        00:00:00  07:59:59     OFF PEAK
2   2   1,7,8            00:00:00  23:59:59     OFF PEAK

3   1   2,3,4,5,6        10:30:00  14:29:59     ON PEAK
3   2   2,3,4,5,6,7      00:00:00  07:59:59     OFF PEAK
3   2   2,3,4,5,6,7      21:00:00  23:59:59     OFF PEAK
3   2   1,8              00:00:00  23:59:59     OFF PEAK
3   3  2,3,4,5,6         08:00:00  10:29:59     SHOULDER
3   3  2,3,4,5,6         14:30:00  20:59:59     SHOULDER
3   3  7                 08:00:00  20:59:59     SHOULDER
```

Figure 7-9 Sample Time-Of-Use File

This file contains three different schedules. Look at the first schedule. For Monday through Friday, 8:00:00 a.m. through 8:59:59 p.m. (20:59:59) is classified as "on-peak", while from midnight (00:00:00) through 7:59:59 a.m., and 9:00:00 p.m. (21:00:00) through 23:59:59 is "off-peak". All day Saturday, Sunday, and holidays are classified as "off-peak". Notice how every second in the week is accounted for.

Time-of-Use periods must be constructed carefully to ensure that they do not overlap, but also cover each hour of every day within the analysis period. Holidays must be accounted for, too. The Analysis Program automatically verifies the Time-of-Use Schedule selected either by the SCHEDULE Command of the Environment File or by a Season Schedule in the Season File. If any errors are encountered, the Analysis Program prints the equivalent of each period as a "mask" on the Analysis Environment Report. Missing times appear as 0; overlapping times appear as a value greater than 1.

Step 5: Modify the Season File (TGY31E.SEA) if Necessary

The Season File is another input for the Analysis Program. It associates date ranges (seasons) in an analysis period with different Time-of-Use schedules. For example, on-peak and off-peak hours may be defined differently for summer and winter months, or a shoulder period may be defined for summer only. Note that it is important that the TOU Periods within Time-of-Use schedules are consistent. This means that if Period 1 is designated as ON PEAK for summer, then Period 1 should be used as ON PEAK periods for winter seasons also.

The Season File is typically set up at installation, and is updated on an as-needed basis. ***WARNING:*** The Season Schedule File is used by many of the Oracle Utilities Load Analysis programs, and therefore by other Oracle Utilities Load Analysis users at your facility. For that reason, do not modify this file without careful consideration, and the knowledge of anyone else who might use the file. You may select local versions of these files, located in your Data directory. Selecting "Default" instructs the program to use the default versions set up by your Oracle Utilities Load Analysis administrator.

Up to 12 distinct seasons can be included in a Season Schedule. Many different time periods can belong to the same season (winter in several different years, for example). Within any Season File, every time period assigned to the same season must also be associated with the same Time-of-Use Schedule.

There can be no underlaps or gaps between periods. Also, all Time-of-Use schedules referred to in the Season File must be defined in the Time-of-Use Schedule File.

When constructing the Season File, you define each season with a single record, using the following format. You must input the data in the same order as in the format example, and separate each parameter with commas and/or one or more blanks.

season-sch# season# tou-sch# date-range [*comment*]

- **Season-Schedule#** — Enter a number to identify the Season Schedule you are creating. The first schedule you enter in the file must be assigned a "1", and all following schedules must be numbered consecutively. The number of schedules is not limited.
- **Season** — Enter a number to identify the season you are defining in the record. There can be up to 12 seasons in a schedule.
- **TOU-Schedule#** — Enter a number to identify the Time-of-Use Schedule (defined in the Time-of-Use File) to be used for this season.
- **Date-Range** — Enter the date and time when the season begins, and the date and time when the season ends. You can use either "mm/dd/yy-hh:mm:ss" or "mmddyyhhmmss" format. Date ranges must begin at the beginning of a full day. Therefore, the beginning time (hh:mm:ss) must be "00:00:00", and the ending time must be "23:59:59". If times other than these are input, they are ignored and "00:00:00" and "23:59:59" are used instead.

All records for each Season Schedule must be grouped together, and season record blocks must be input in ascending order by Season Schedule number. For example, in Figure 7-10: Sample Season File there are seven records associated with Season Schedule number 1, and they precede Season Schedule number 2.

Remember, a Season Schedule selected (via the SEAson Environment File Command) for use in the Analysis Program must contain season segments covering all times in the analysis periods, with no gaps and no overlaps. If the program detects a gap or an overlap in the designated Season Schedule, it will produce an error message and stop processing.

Figure 7-10: Sample Season File illustrates a Season File containing two season schedules, one defining two distinct seasons and the other defining four. Either Season Schedule 1 or Season Schedule 2 could be used for an analysis of the period from July through December of 1992, for example; but only Season Schedule 2 could be used over the same months in 1993.

```
1,1,1,11/15/91-00:00:00,04/20/92-23:59:59,WINTER
1,2,2,04/21/92-00:00:00,06/11/92-23:59:59,SPRING
1,3,3,06/12/92-00:00:00,08/31/92-23:59:59,SUMMER
1,4,4,09/01/92-00:00:00,11/14/92-23:59:59,FALL
1,1,1,11/15/92-00:00:00,04/20/93-23:59:59,WINTER
1,2,2,04/21/93-00:00:00,06/11/93-23:59:59,SPRING
1,3,3,06/12/93-00:00:00,08/31/93-23:59:59,SUMMER
1,4,4,09/01/93-00:00:00,11/14/93-23:59:59,FALL

2,1,1,11/12/91-00:00:00,04/20/92-23:59:59,WINTER
2,2,2,04/21/92-00:00:00,11/11/92-23:59:59,NON-WINTER
2,1,1,11/12/92-00:00:00,04/20/93-23:59:59,WINTER
2,2,2,04/21/93-00:00:00,11/11/93-23:59:59,NON-WINTER
2,1,1,11/12/93-00:00:00,04/20/94-23:59:59,WINTER
```

Figure 7-10 Sample Season File

This file contains two different schedules. Look closely at the first schedule. Four distinct seasons are defined and associated with different Time-of-Use schedules. Notice how all times in the analysis period are accounted for.

Step 6: Modify the User-Specified Day File (TGY31F.USD) if Necessary

The User-Specified Day File is an optional input file for the Analysis Program. It is used to specify a group of days to be averaged together when the AVE option is used for reporting or writing statistics. For example, you could specify several summer peak days to be averaged together. Statistics are the same as those created for average-type days.

WARNING: The User-Specified Day File is used by many of the Oracle Utilities Load Analysis programs, and therefore by other Oracle Utilities Load Analysis users at your facility. For that reason, do not modify this file without careful consideration, and the knowledge of anyone else who might use the file. You may select local versions of these files, located in your Data directory. Selecting "Default" instructs the program to use the default versions set up by your Oracle Utilities Load Analysis administrator.

The file consists of a list of dates. The first date may have two label parameters (each label consisting of up to 13 characters enclosed in single quotes) used to identify the average day type on reports. The format for the first date is:

MM/DD/YY 'label1' 'label2'

Each day thereafter has only the date. Enter one date per line. The length of the file is unlimited. Figure 7-11: Sample User-Specified Day File illustrates a User-Specified Day File for averaging summer peak days.

When the Analysis Program runs, it reads the User-Specified Day File if the AVE option is specified in the Analysis Environment File's Report and/or Write commands. If one or more dates in the file are within the Analysis Program's date range, then a User-Specified Day Statistic is created. The default labels for the statistic record, if not specified by the user on the first date, are

'USER-SPECIFIED' and 'DAY-TYPE'. The middle qualifier of the statistic record created is 'USD' (e.g., STAR-USD-MEAN).

```
06/20/98          'SUMMER' 'PEAK DAYS'
07/13/98
07/19/98
08/01/98
09/09/98
09/10/98
```

Figure 7-11 Sample User-Specified Day File

Step 7: Verify the Holiday File (TGY31C.HOL) Set Up

Like the TOU File and Season File, the Holiday File (Figure 7-12: Sample Holiday File) is another input for the Analysis programs. It is typically set up at system installation, and updated just once a year. It contains a list of the dates of all national and local holidays that apply to your service territory. You may select local versions of these files, located in your Data directory. Selecting "Default" instructs the program to use the default versions set up by your Oracle Utilities Load Analysis administrator.

In the unlikely event that you will need to change the file, the following explains its structure.

The file is created using this record format:

```
mm/dd/yy
```

Enter one date per line. The length of the file is unlimited.

```
01/01/97
02/16/97
04/17/97
05/25/97
07/04/97
09/07/97
11/26/97
12/25/97
01/01/98
02/15/98
05/24/98
07/04/98
09/06/98
11/11/98
11/24/98
12/25/98
01/01/99
01/16/99
02/20/99
05/29/99
07/04/99
09/04/99
11/11/99
11/23/99
12/25/99
```

Figure 7-12 Sample Holiday File

Step 8: Run the Standard Load Analysis Program (Y310 or Y330)

Once you have created and verified the necessary input files, you are ready to run the Analysis Program. Use Y310 for Standard Load Analysis or Y330 for Ratio Analysis.

Standard Load and Ratio Analysis Processing — Processing in the Standard Load and Ratio Analysis programs consists of the following steps:

1. The Environment File is processed. If an error is detected, the program terminates with a diagnostic.
2. The Holiday File is processed. If an error is detected, the program terminates with a diagnostic.
3. If a Season Schedule was specified, the Season File is processed. If an error is detected, the program terminates with a diagnostic.
4. The Time-of-Use File is processed. If an error is detected, the program terminates with a diagnostic.
5. The Control File is processed. For each customer, the following steps are performed:

   For Standard Load Analysis: The customer-id, channel(s), and optional fixed stratum are read. If fixed stratification has been selected, the *stratum is required* and *must match one of the strata specified in the Environment File.* If an error is detected, the customer is dropped and processing continues with the next customer.

   For Ratio Analysis: The customer-id, channel(s), fixed stratum, and optional customer billed energy value are read. If fixed stratification has been selected, the *stratum is required* and *must match one of the strata specified in the Environment File.* If the billing option was set to “YES”, the energy values in the Control File are used in the ratio estimates. If an error is detected, the customer is dropped and processing continues with the next customer.

6. If the ROLLING option is selected, the combined channel is converted to rolling average intervals at the specified "window" size. If intervals within a window are below the desired level, they are considered missing and the resulting average is given a status code of '5'.
7. The customer's energy array is scanned for missing data over the entire analysis period. If the number of missing intervals exceeds the drop threshold specified in the Environment File, the customer is dropped and processing continues with the next customer.
8. The customer's energy array is scanned for missing data on a time-of-use period basis. If all data within any time-of-use period is missing, the customer is dropped and processing continues with the next customer.
9. The following statistics are calculated within each time-of-use period:
    - Actual energy
    - Prorated energy (if selected) based on the ratio of expected intervals to non-missing intervals
    - Non-coincident demand, date and time
    - Load factor based on non-coincident demand and average (prorated) demand.
10. The following statistics are calculated for the entire period:
    - Actual energy, defined as the sum of time-of-use period actual energies
    - Prorated energy (if selected), defined as the sum of time-of-use period prorated energies
    - Non-coincident demand, date and time
    - Load factor based on non-coincident demand and average (prorated) energy.
11. The following statistics are calculated for each supplied peak:
    - Coincident demand
    - Load factor based on coincident demand and average (prorated) energy from the entire period
    - Diversity factor.
12. If preliminary analysis is selected, processing continues with the next customer; otherwise, the stratification basis is examined. If floating stratification is in effect, the customer's energy, non-coincident demand, or load factor is compared to the stratum boundary values specified in the Environment File.
13. The customer's energy array is converted to demand units, and is accumulated into the sum of demands, sum of squared demands, and sample size, for the indicated stratum for each interval in the period.
14. If preliminary analysis is selected, the program skips to the output section for individual customer statistics.
15. The stratum arrays are checked for completeness. If one or more strata is empty, the program issues a diagnostic and skips to the output section. If a *stratum sample size exceeds the population specified in the Environment File, the program assumes 100% sampling* for the stratum and issues a diagnostic.
16. The following five steps apply to Ratio Analysis only:
    - Depending on the billing option selected and the customer's interval status codes, either the customer's recorded energy or billed energy is accumulated into a sum of energies and sum of squared energies for the indicated strata for each interval of the period.

- For the separate ratio estimate, the ratio of mean demand divided by mean energy is calculated for each strata, and these ratios are multiplied by the corresponding stratum's total billed energy to produce estimates for each strata of the analysis. The individual strata are then summed to obtain total class demand for each interval of the analysis period. The ratio statistic is written to the ELDB (suffix = 'RRAT').
- For the combined ratio estimate, the ratio is computed by dividing total demand summed over all strata by total energy summed over all strata and multiplying this ratio by total billed energy for the class. This calculation of total class demand is performed for each interval of the analysis period. The combined ratio statistic is written to the ELDB (suffix = 'CRAT').
- For the non-stratified ratio estimate, the calculation is basically the same as for the combined ratio estimate, except only one strata is involved.
- For each of the above estimates, a different set of tests is performed to determine if the analysis assumptions are correct. The tests are conducted on an interval-by-interval basis for all intervals of the analysis period. If any of these tests is not passed, then for that interval, the ratio estimate and associated statistics computed may not yield accurate results.

17. The strata statistics for coincident demands are computed according to the methodology listed in *Appendix B: Analysis Equations*. A sample evaluation report is printed for the entire period, and the coincident demand statistics are written to the ELDB.
18. The maximum and minimum demands and the dates and times are computed over the entire period, by time-of-use, for supplied peaks (no minimum), and for strata peaks.
19. Coincident demands are computed, reported, and written to the ELDB for the following types of days:
    - Average day
    - Average day, excluding holiday
    - Average weekday
    - Average weekday, excluding holiday
    - Average weekend
    - Average weekend including holidays
    - Average weekend, excluding holidays
    - Average Sunday, Monday,..., Saturday
    - Weekday holiday (if available)
    - Weekend holiday (if available)
    - Average User-Specified Day (if available)
    - Days of maximum demands (entire period, and by time-of-use)
    - Days of minimum demands (entire period, and by time-of-use)
    - Days of supplied peaks (if available).
20. Individual customer coincident demands are retrieved for the strata peak, and for class peak over the entire period and by time-of-use. Customer load factors and diversity factors are also computed.

    The following class, sample, and strata statistics are computed from the individual customer statistics:

    - Non-coincident demand
    - Energy

- Load factor based on maximum coincident demand
- Load factor based on non-coincident demand
- Diversity factor
- Coincidence factor
- Standard deviation of residuals of demand (sample and strata only).

The above statistics are reported and written to the ELDB. For both preliminary and complete analysis, the individual customer statistics are reported and written to a sequential file.The statistics written to the ELDB may also be exported to a graph file.

Bias Tests — Ratio Only

There are two types of checks on the accuracy of the analysis estimates. First, *due to a small sample size, the large sample formula for the estimated variance of the ratio estimates may be an underestimate.* This will make the estimates appear more accurate than they really are. Second, because of the tendency for the ratio estimates to be biased, a test is performed to ensure that the bias is negligible. In practice the *bias isn't important in large or moderate size samples. However, for small samples and in stratified sampling with many strata, the bias can be significant.* A large bias can cause a ratio estimate of the mean load to be substantially different from the true population mean.

- In a ***non-stratified ratio analysis*** three separate tests are performed to ensure accurate estimation results. These consist of a ***sample size test*** and ***two tests for bias***. The sample size test checks to see if the sample size for every interval of the analysis period is ***30 customers or more***. If the sample size is below 30, an "N" (for "Not 30 or more customers") is printed in the Bias Flag field, warning that the sample size may be too low for the large sample variance formula to be applicable. Two bias tests are also performed, one based on ***energy*** and one based on ***demand***. The ***energy bias test compares the coefficient of variation of energy*** (the ratio of the standard error of the sample mean energy divided by the sample mean energy) ***to the value 0.2***, a cutoff level for bias based on empirical research. If the ***coefficient of variation for energy is greater than or equal to 0.2, the estimates may suffer due to biased results,*** and an "E" (for "Energy test results may be biased") is printed in the Bias Flag field. A ***similar bias test is applied to demand using its coefficient of variation,*** with a "D" (for "Demand") being printed if this test fails. These three tests are performed in the order stated above. Whenever a test fails, none of the succeeding tests are performed and the flag printed represents only the failed test.
- In a ***combined ratio analysis*** only two tests are done. They are the ***sample size test*** (with "N" indicating failure) and the ***energy bias test*** (where an "E" indicates failure). For the sample size test, the ***total sample size for the combined strata is tested against the cutoff value of thirty***. The energy bias test is the same as the one used in the non-stratified analysis, and the same considerations and interpretations are applicable.
- In a ***separate ratio analysis,*** two tests are also performed to test sample size and the energy bias. The sample size test is the same as the one employed in both non-stratified and combined ratio analysis. The ***energy bias test*** is different from those already mentioned, because it ***tests the square root of the product of the number of strata multiplied by the coefficient of variation for energy, against a cutoff of 0.6***. This larger value for the cutoff reflects the fact that the bias calculation includes an accumulated value over all strata, and therefore a larger value can be tolerated and still result in negligible bias. If this test fails, an "S" (for "failure of the Separate ratio analysis") is placed in the Bias Flag field.

The appearance of a Bias Flag for a number of intervals in any ratio analysis does not mean the results are invalid. It should be interpreted as a potential problem that can lower the accuracy and precision of the resultant calculations, but it does not invalidate the analysis. Analysts should carefully consider the results obtained and try to correct the deficiencies in their data, if possible. For more information on all these tests and their impact on the ratio estimates produced, see *Chapter 6* of Cochran's book, *Sampling Techniques*, 3rd edition, John Wiley and Sons publishers, 1977.

Step 9: Check Output

At the end of a run, both the Standard Load Analysis and Ratio Analysis programs produce five outputs: analysis reports, statistics written to the ELDB (or alternate database), the Individual Customer Statistics File, the Keylist File, and the Written Key File.

- **ELDB Statistics** — Unless you specified the "WRITE NO" option in the Analysis Environment file, the program will write all statistics back to the ELDB, saving them for further reporting and analysis. The statistics are stored as simulated cuts with statistics identifiers (see **Statistics Records** on page 3-8 for an explanation of these IDs). At the end of a run, the program produces a list of all of the statistics written to the database in a report entitled "Analysis Statistics Written to the ELDB" (TGY315-01 for Standard Load Analysis, TGY335-01 for Ratio Analysis). Both the format of this report and the IDs of all possible types of statistics produced by the programs are summarized in ***Appendix D: Reading "Analysis Statistics Written to the ELDB" Reports and Listings of Analysis Statistic Names*** of this manual.
- **Individual Customer Statistics File** — This file (TGY318.DAT) is optionally produced at the end of each successful analysis run. It is a sequential file containing the basic load statistics for each customer in the analysis, and can be used for further analyses with external programs. Numbers are written in "character" or "binary" format, depending on how you entered the "ICS" Command in the Environment File. You have three options for handling this file:
  - Write it to a dummy file so that it is not saved, conserving space in the database
  - Write it over an existing file at the end of each analysis run
  - Save it as a catalogued file, preserving the file for further use.

  Note: Appendix E: Individual Customer Statistics File Formats details the contents and format of the Individual Customer Statistics File.
- **Keylist File** — This file (TGY317.DAT) is automatically produced at the end of each successful analysis run. It is a sequential file containing a list of keys (customer-id, channel) of records that were requested but not included in the analysis. This file can be used as a Control File for running subsequent Oracle Utilities Load Analysis programs, such as the Summary Report, to diagnose why the key was excluded.
- **Written Key File** — This file (KEYLIST.DAT) is produced at the end of each successful analysis run. It is a sequential file containing a list of keys (customer-id, channel, start-time).

Chapter 8

Computing Statistics for 100% Sampled Populations (Y380)

This chapter explains how to use the 100% Sample Analysis Program to compute load statistics for 100% sampled populations such as large industrials. Topics in this chapter are:

- **What Does the 100% Sample Analysis Program Do?**
- **Steps for Using the 100% Sample Analysis Program (Y380)**

What Does the 100% Sample Analysis Program Do?

The 100% Sample Analysis Program is used to compute load statistics for 100% sampled populations such as large industrials. It allows a variable population and may optionally perform a stratified analysis (fixed strata only). The program does not perform an expansion. It assumes that missing intervals mean that a customer left the system and the population is less. The analysis program requires users to estimate missing data for customers who are part of the sample. There is no need for expansion because the class is 100% sampled. This is the only accurate way to analyze samples of the largest and most diverse customers.

This program analyzes periods of up to a year. Based on the information provided by the input files, the 100% Sample Analysis Program computes coincident demands, non-coincident demands, energy, load factors, and diversity factors. These statistics are provided for the customer and population levels within an analysis group. Statistics are also calculated by time-of-use period, and, in some cases, by type of day. Means and standard deviations are computed for sample evaluation. Most of the statistics are reported and written to the ELDB for additional evaluation and reporting. These statistics may be archived to the SLDB.

100% Sample Analysis also creates a file *of individual customer statistics that may be accessed by user programs.*

Steps for Using the 100% Sample Analysis Program (Y380)

Here is a brief list of the steps you will follow when analyzing load data for 100% sampled populations (Figure 8-1: Overview of the 100% Sample Analysis Program). The remainder of this chapter explains these steps in detail.

Summary - Using 100% Sample Analysis

1. Make sure that the database (CLDB or ELDB) contains load data for all customers who are part of the sample.
2. Create the Analysis Control File (TGY38A.CTL) - a list of the customers to be analyzed and, if using fixed strata analysis, the strata to which they should be assigned.
3. Create the Analysis Environment File (TGY38B.ENV) - a group of commands that you use to set analysis and reporting options.
4. Verify or modify other required input files:
    - Time-of-Use Schedule File (TGY31D.TOU)
    - Season Schedule File (TGY31E.SEA)
    - User-Specified Day File (TGY31F.USD)
    - Holiday File (TGY31C.HOL).
5. Run the 100% Sample Analysis Program (Y380).

Note: The Y310 program supports pre-process key generator. See **Using the Preprocess Key Generator in a Control File** on page 4-4 for more information.

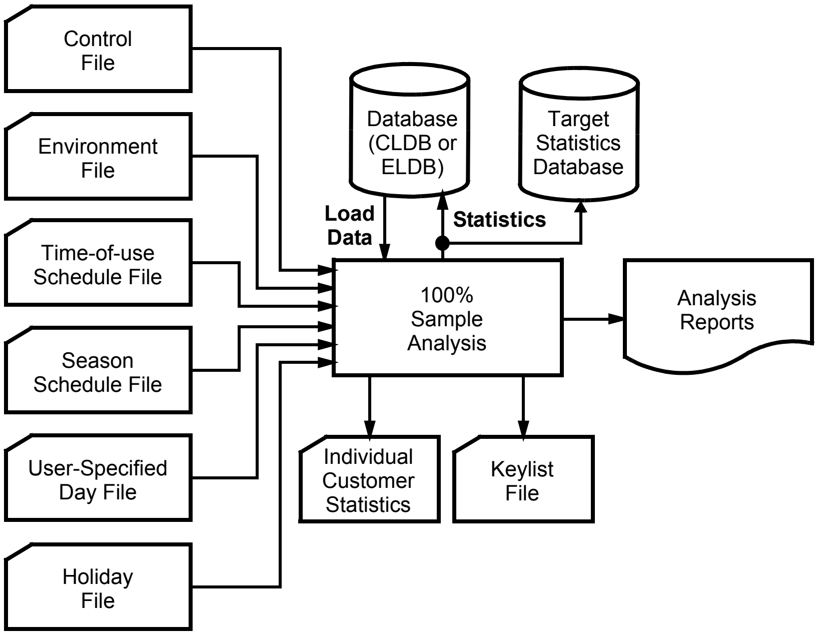


Figure 8-1 Overview of the 100% Sample Analysis Program

Step 1: Ensure the database (CLDB or ELDB) contains Load Data for all customers.

Important: In order to use the 100% Sample Analysis Program correctly, it is necessary to have acceptable quality load data for *all* customers in the sample. That's because the program assumes that missing intervals mean that the customer left the system and the population is less. Therefore, before analysis you must estimate missing data for any customers who should be included. You can do that using the Load Data Editor described earlier in this manual. (Of course, if a customer actually left the system during the analysis period, you would not fill in their missing data.)

Here are some other important points to keep in mind about load data for the analysis:

Time Periods — It is important to remember that you can analyze data for any customer subset and any time period for which data exists in the CLDB/ELDB. You are not constrained by extraction periods. In other words, even though it may be the policy at your facility to extract data in monthly increments, you can analyze data for any time period made up of whole days without having to re-extract the data.

Frequency — If you want to analyze data at a frequency higher than what exists in the CLDB/ELDB, you will have to re-extract it at the desired frequency.

Quality — Because the program requires data for all customers in the sample, you cannot use the Environment File commands to exclude bad-quality data, as you can with the Standard Load or Ratio Analysis programs. You may want to fix bad data using the Load Data Editor before analysis.

Preliminary Recording — If you have any questions about the data, you may want to select the PRELIMINARY option in the Environment File. This option enables you to preview results before executing full-scale analysis and reporting.

Step 2: Create the Analysis Control File (TGY38A.CTL)

The Analysis Control File consists of a list of keys identifying the customers to be analyzed and, if using fixed strata analysis, the strata to which each customer should be assigned. (Figure 8-2: Sample 100% Analysis Control File).

The Analysis Control File allows you to combine multiple channels of data for a single customer-id into a single “cut” for analysis. It is important to remember that each entry in the Control File is a sample point. If you are analyzing end uses, it would be appropriate to keep channel-numbers separate. If you are analyzing “total premise loads”, you may want to combine the channel-numbers for a single customer. You can do that in the Analysis Control File. However, if you want to combine multiple customer-ids for a large individual customer to create a single sample point, you will have to use the Load Data Transformation Program (Y620) before analysis. There are three options for creating the Analysis Control File:

- **Key Generator Program** — enables you to quickly generate a list of customers that match specific criteria, based on fields in the Oracle Utilities Load Analysis Load Data Records. For example, you can create a list of all customer records that have a particular identifier code or a particular start-time. You can base your request on any field or combination of fields in the CLDB/ELDB data record. See **Chapter 14**: **Key Generators — Shortcuts for Creating Input Files and Reports** for an explanation of how to use the CLDB/ELDB Key Generator program.
- **Customer Data Extraction (CDE) Program** — enables you to quickly generate a list of customers that match specific criteria, based on fields in the user-defined Customer Attribute File. For example, you could typically create a list of all customers that are in a given geographic area or have a particular SIC code.

```
A7301   1        /* KEYS FOR STANDARD LOAD ANALYSIS
B7308   2
B7311   1
B7312   1+2      /* ADD CHANNELS 1 AND 2
B7393   1+2
B7397   1
C7378   1
D7316   1+2
E7333   2-1      /* SUBTRACT CHANNEL 1 FROM CHANNEL 2
E7336   2-1
F7338   1+2
G7339   1+2+3
G7342   1+2+3
G7480   3-2-1
L7353   1
```

Figure 8-2 Sample 100% Analysis Control File

- **Manually** – you can type the file.

No matter which approach you use, the file must be constructed of a series of control records using the format specified below, with one record for each sample point. You may input blank spaces or commas between elements in the command record, with the exception that blanks are not allowed before or after an operator if combining channels.

customer-id chan1 [{±}*chan2* [{±}*chan3*...[{±}*chann*]]] [*stratum-number*]

- **customer-id** — (required) enter the Oracle Utilities Load Analysis customer-id
- **chan1, chan2...chanx** — (required) enter the channel-number or a combination of channels for that customer-id. A combination consists of two or more channels added or subtracted to represent the total customer load (e.g., 1+2-7 is the sum of channels 1 and 2 minus channel 7,

a co-generation unit. Do not add blanks before or after an operator. The data is combined strictly for the analysis; no new records are created.

Note: At least one channel-number is required per record.

- **stratum-number** — enter the stratum number to which the customer is assigned. This parameter is required if you enter more than one STRata command in the Environment File; otherwise it is optional and ignored if present.

Step 3: Create the Analysis Environment File (TGY38B.ENV)

You use the Analysis Environment File to specify the conditions under which you want the analysis to be performed and reported.

The file is made up of the commands summarized in below. When creating the file, enter one command per line. Each line must begin with the command name (keyword); but you need enter only the first three letters of the keyword. You may enter the commands in any order. If you do not specify a command, the program will assume the default (underlined). Following is a detailed description of each command.

To users familiar with the Standard Load Analysis Program: the commands that make up the 100% Sample Analysis Environment File are identical to those in the Standard Load Analysis Environment File, *except* that:

- Because the 100% Sample Analysis Program performs a fixed stratified analysis only and no expansion, the Alpha and Assign commands are not included.
- Because correct operation of the 100% Sample Analysis Program requires interval data for all customers in the analysis group, the Drop, Prorate, and Quality commands are not included.

DATe *start-date stop-date*

AGGregate [*n* | 3600]

ROLling *n*

STRata *stratum-number* [*comment*]

SCHedule [*t* | 0] [**NOPrint** | **PRInt**]

SEAson [*s* | 0] [,**NOPrint** | ,**PRInt**]

PEAk *peak-time*

GRA

GROup *title*

ICS [**CHAracter** | **BINary**]

REPort [**PREliminary** | **NOEvaluation** | **NOStrata** | **COMplete**]
[**AVErage**][**PEAk**][**MINimum**][**CD**][**MCD**]
[**NCD**][**ENErgy**][**FACtor**][**DAIly**][**ICS**][**ENTire**]

KEY [*key* **| STAR]**

WRIte [**NO** | **NOStrata** | **COMplete**] [**AVErage**][**PEAk**]
[**MINimum**][**CD**][**MCD**][**NCD**][**ENErgy**] [**FACtor**][**ENTire**]

MINinum [0 | **ZERo** | **NONZero**]

DATe *start-date stop-date*

- **Date** — A required command that you use to establish the analysis period. Both times may be specified in the form "mm/dd/yy" or "mm/dd/yy-hh:mm:ss". If the former is used, 00:00:00 is assumed to be the Start Time, and 23:59:59 is assumed to be the Stop Time. You can select any date range for which data exists in the Extracted Load Database, with the following limitations:

  The analysis period **must** be a multiple of 24 hours.

  The date range cannot exceed one year for 900-second data.

AGGregate [*n* | 3600]

- **Aggregate** — Input "n" to establish the number of seconds-per-interval for the analysis data; 300, 900, 1800, 3600, and 86400 are permitted values. 3600 is the default.

  Where possible, Oracle Utilities Load Analysis will sum each customer's load data to the specified level.

  Note: The minimum aggregation level is 900 seconds.

ROLling *n*

- **Rolling** — An optional command that enables you to report the analysis results in a rolling format. That is, each interval of the analysis period is an average of a number of preceding interval values and the current interval itself.

  The Rolling Command consists of one parameter "n" to specify the level of aggregation for use in computing the rolled interval.

  The value for "n" must be greater than, and a multiple of, the analysis data's interval length. The default value is "3600". The program will average the analysis data at the level set by "n". For example, if the original analysis data has a level of aggregation of 900 seconds-per-interval and you set "n" to 3600, then each output interval will be the average of itself and the three preceding 900-second interval values.

STRata *stratum-number* [*comment*]

- **Strata** — How you set up the Strata Command(s) largely determines what kind of analysis the program performs. Generally, you supply one Strata Command for each stratum in a stratified analysis. If you supply just one Strata Command in the file, or if you omit the command, the program performs a non-stratified analysis.

  Input command line for each stratum in the analysis. **Up to 99 strata may be defined**.

  The following defines each parameter in the command:

  - **stratum-number** — Identifies the stratum. It must be a positive integer from 1 to 99. Within the file, stratum numbers must appear in ascending order, but need not be consecutive.
  - **comment** — This optional field is used to describe the stratum in the report. The program uses only the first 12 characters, but the comment can contain more than that. If the comment is enclosed in single quotes, the comment can contain blanks. If the comment is not enclosed, the comment cannot contain blanks.

    Note: The minimum aggregation level is 900 seconds.

SCHedule [*t* | 0] [**NOPrint** | **PRInt**]

- **Schedule** — Use this command to select a single schedule from the Time-of-Use File (TGY31D.TOU) for the time-of-use calculations. The parameter "t" is a non-negative integer representing a particular schedule in the file. The default, “SCHEDULE 0”, automatically defines a single time-of-use period equal to the analysis period.

Use the PRINT option if you want to print graphs of the time-of-use periods as part of the Analysis Environment Report; use the NOPRINT option if you do not want a hard copy of the graphs. The default is PRINT, except for SCHEDULE 0, for which the default is NOPRINT.

Note about the Time-Of-Use File: Instructions for modifying or adding new schedules to the Time-Of-Use Schedule File are provided in Step 4 of *Chapter 7: Expanding Load Data to Class-Level Estimates Using the Load Analysis Programs (Y310 and Y330)*. It is very important to keep in mind that any schedule you select must cover the entire analysis period. If the program encounters a gap, it will stop processing and issue a warning message.

SEAson [*s* | 0] [,**NOPrint** | ,**PRInt**]

- **Season** — Use this command to select a schedule from the Season File (TGY31E.SEA). Specifying a Season Schedule makes it possible to apply different Time-Of-Use schedules to different portions of the analysis period.

  The parameter “s” is a non-negative integer representing a particular Season Schedule within the Season Schedule File. The default, “SEASON 0”, indicates that a single Time-Of-Use Schedule, as specified in the SCHEDULE Command, is to be applied over the entire analysis period.

  The PRINT option indicates that graphs of time-of-use periods are to be printed with the Analysis Environment Report; the NOPRINT option suppresses the printing of these graphs. The default is PRINT.

  > **Note:** Either the Season Command or the Schedule Command may be used to define time-of-use periods for analysis processing, but not both. If you include both commands in the Environment File, the program will use the Season Command and disregard the Schedule Command. If you include neither command, the default is “SCHEDULE 0, NOPRINT”.

  About the Season File: Instructions for modifying or adding new schedules to the Season Schedule File are provided in Step 5 of *Chapter 7: Expanding Load Data to Class-Level Estimates Using the Load Analysis Programs (Y310 and Y330)*. It is very important to keep in mind that any schedule you select must cover the entire analysis period. If the program encounters a gap, it will abort processing and issue an error message.

PEAk *peak-time*

- **Peak** — This command enables you to specify the date and time of peaks of interest that are not automatically computed by Oracle Utilities Load Analysis — such as system peak. Oracle Utilities Load Analysis will compute statistics for the entire day in which each supplied peak falls.

  You must use the format “mm/dd/yy-hh:mm:ss” to specify the peak. You can input up to 25 peaks. Input one peak per line. The default is no peaks

GRA

- **GRA** - This command determines that a graphics file is produced when running this program.

GROup *title*

- **Group** — Use the Group Command to assign a title to appear at the top of each analysis report produced at the end of the program run. You can input one or two Group commands (one per line), for one or two titles at the top of the reports. Each title is limited to 98 characters. If you omit the command, no title will be printed.

ICS [**CHAracter** | **BINary**]

- **ICS** — This command establishes the format for numbers written in the Individual Customer Statistics File (a file containing basic load statistics for each customer in the analysis).

  Select "CHARACTER" to write numbers in "picture" format, that is, numbers and characters that can be easily interpreted by the user. This option should be used if you want to examine the contents of the file.

  Select "BINARY" to write numbers in binary format, that is, a compressed format that cannot be read easily by the user. Numbers that are written in binary format can be readily interpreted by computer programs, and require less storage space. Binary format numbers are equivalent to PL/1 Float Binary or COBOL COMP1 formats.

  The default for the command is "ICS BINARY".

  > **Note:** The Binary format will be depreciated in future releases.
  >
  > The record formats for both types of files are shown in *Appendix E: Individual Customer Statistics File Formats*.

REPort [**PREliminary** | **NOEvaluation** | **NOStrata** | **COMplete**]
[**AVErage**][**PEAk**][**MINimum**][**CD**][**MCD**]
[**NCD**][**ENErgy**][**FACtor**][**DAIly**][**ICS**][**ENTire**]

- **Report** — Use the primary options of this command to specify which groups of statistics Oracle Utilities Load Analysis should calculate and report, and use the secondary options if you wish to print only selected reports. See the tables later in this chapter for a summary of your options.

  > **PREliminary** — When you select this option, Oracle Utilities Load Analysis will produce only the Analysis Environment and Individual Customer Statistics reports (TGY380-01 and TGY381-90). This option enables you to preview the analysis results on a customer basis before incurring the overhead associated with a complete analysis.
  >
  > **NOStrata** — This option produces all report types, but does not report the information on individual strata usually included in the Sample Evaluation reports. This option is useful when class totals are needed for each interval of the analysis period, but none of the strata detail. This option does not affect the reporting of the major statistics, which still include results broken down by strata.
  >
  > **NOEvaluation** — This option suppresses the printing of all components of the Sample Evaluation reports. Because these reports tend to be very lengthy, this option can substantially reduce the size of the hard copy output. Use this option when you want only the major statistics and analysis environment reports.
  >
  > **COMplete** — Select this option to calculate all statistics and print *all* reports. REPORT COMPLETE is the default.

  Use the secondary options if you wish to print only selected reports. The program will still calculate all statistics based on your input for the primary options, but only the specified report(s) will be printed based on the secondary options. For example, if you want to calculate all statistics but print only the Energy Report and Individual Customer Statistics Report, use this command: "REP COM ENE ICS".

AVErage — prints all average day type evaluation reports: TGY380-08 through TGY380-23.

PEAk — prints all peak day and supplied peak evaluation reports: TGY310-24-2X.

MINimum — prints all minimum day reports: TGY380-XX.

CD — prints the Maximum Coincident Demand Report: TGY381-10.

MCD — prints the Minimum Coincident Demand Report: TGY381-15.

NCD — prints the Noncoincident Demand Report: TGY381-20.

ENErgy — prints the Energy Report: TGY381-30.

FACtor — prints the Load Factor, Diversity Factor, and Coincidence Factor Report: TGY381-40.

DAIly — prints Daily Maximum, Minimum, and Average Demands Report: TGY380-2X.

ICS — prints the Individual Customer Statistics Report: TGY381-90.

ENTire — prints the Entire Period Sample Evaluation Report: TGY380-03.

KEY [*key* **| STAR]**

- **Key** — Use the Key Command to assign an identifier to each of the statistics produced by the analysis run. This identifier becomes the prefix in the statistics name (see **Statistics Identifiers** on page 3-8).

  You can use up to 40 characters. A combination of characters (A - Z) and digits (0 - 9) may be used, but special characters (anything that is not a letter or number) are *not* allowed. The identifier **must** start with an alphabetic character. The default key is “STAR”.

WRIte [**NO** | **NOStrata** | **COMplete**] [**AVErage**][**PEAk**] [**MINimum**][**CD**][**MCD**][**NCD**][**ENErgy**] [**FACtor**][**ENTire**]

- **Write** – Use this command to determine which statistics, if any, should be written back to the ELDB.

  NO – No statistical records are written back to the ELDB, even if you specify any of the secondary WRITE options. Use this option when you need just the hard copy output reports.

  NOStrata– No statistical records are written to the ELDB for individual strata.

  COMplete– Writes all statistical records produced by the analysis run back to the ELDB. This is the default.

  Use the secondary options in conjunction with the COMPLETE option to write only selected statistics. The program will still calculate all the statistics based on your input for the primary options, but only the specified statistics will be written to the ELDB.

  AVErage — Writes all average day-type statistics such as average weekday.

  PEAk — Writes all statistics for peak day and user-supplied peak days.

  MINimum — Writes all minimum day statistics.

  CD — Writes Maximum Coincident Demand statistics.

  MCD — Writes Minimum Coincident Demand statistics.

Example 100% Sample Analysis Environment File

NCD — Writes Maximum Noncoincident Demand statistics.

ENErgy — Writes Energy statistics.

FACtor — Writes statistics corresponding to Load, Diversity, and Coincidence factors.

ENTire — Writes Entire Period statistics.

MINinum [0 | **ZERo** | **NONZero**]

- **MINimum** — This command enables you to determine if the Daily Maximum, Minimum, and Average Demands Report (TGY380-2X) will process zero-values as minimums or ignore them as missing. If "0" or "ZERO" is specified, zero-values will be shown as minimums. This might be appropriate, for example, if the analysis is on streetlighting data. "NONZERO" is the default.

Step 4: Verify or modify other Required Input Files

Along with the Control and Environment files, four other input files may be required for a 100% Sample Analysis (depending upon your selections in the Environment File):

- Holiday File (TGY31C.HOL) is a list of holidays observed in your service territory.
- Time-of-Use Schedule File (TGY31D.TOU) is a series of TOU schedules.
- Season Schedule File (TGY31E.SEA) is a series of Season schedules that enable you to apply different TOU schedules at different times of the year.
- User-Specified Day File (TGY31F.USD) specifies a group of contiguous or non-contiguous days that may be averaged together for analysis (for example, a set of summer peak days).

Typically, these files are established at system installation and seldom modified. Should you need to update or modify these files (if you want to experiment with a new Time-Of-Use Schedule, for example) see steps 4 - 7 of *Chapter 7: Expanding Load Data to Class-Level Estimates Using the Load Analysis Programs (Y310 and Y330)*. Alternately, you may select local versions of these files, located in your Data directory. Selecting "Default" instructs the program to use the default versions set up by your Oracle Utilities Load Analysis administrator.

Step 5: Run the 100% Sample Analysis Program (Y380)

Once you have created and verified the necessary input files, you are ready to run the Analysis Program. Use Y380.

100% Sample Analysis Processing: For your information, processing in the 100% Sample Analysis Program consists of the following steps:

- The Environment File is processed. If an error is detected, the program terminates with a diagnostic.
- The Holiday File is processed. If an error is detected, the program terminates with a diagnostic.
- If a Season Schedule was specified, the Season File is processed. If an error is detected, the program terminates with a diagnostic.
- The Time-of-Use File is processed. If an error is detected, the program terminates with a diagnostic.
- The Control File is processed. For each customer, the following steps are performed:

  The customer-id and channel(s) are read. If an error is detected, the customer is dropped and processing continues with the next customer.

The indicated channel(s) is retrieved from the CLDB/ELDB for the analysis period and aggregated accordingly. If an aggregated interval is incomplete, it is assigned a status code of '7'. Each channel is converted to energy units and, if necessary, combined. *Combined intervals are assigned the worst of the component status codes*; incomplete combined intervals are assigned a status code of '7'. If one or more channels is missing in its entirety, the customer is dropped, and processing continues with the next customer.

- The customer's energy array is scanned for missing data on a time-of-use period basis. If all data within any time-of-use period is missing, the customer is dropped and processing continues with the next customer.

  The following statistics are calculated within each time-of-use period:

  Actual energy

  Non-coincident demand, date and time

  Load factor based on non-coincident demand and average demand.

- The following statistics are calculated for the entire period:

  Actual energy, defined as the sum of time-of-use period actual energies

  Non-coincident demand, date and time

  Load factor based on non-coincident demand and average energy.

- The following statistics are calculated for each supplied peak:

  Coincident demand

  Load factor based on coincident demand and average (prorated) energy from the entire period

  Diversity factor.

- The customer's energy array is converted to demand units, and is accumulated into the sum of demands, sum of squared demands, and sample size, for the indicated stratum for each interval in the period.
- If preliminary analysis is selected, the program skips to the output section for individual customer statistics.
- The statistics for coincident demands are computed according to the methodology listed in *Appendix B: Analysis Equations*. A sample evaluation report is printed for the entire period, and the coincident demand statistics are written to the ELDB.
- The maximum and minimum demands and dates and times are computed over the entire period, by TOU, for supplied peaks (no minimum), and for strata peaks.
- Coincident demands are computed, reported, and written to the ELDB for the following types of days:

  Average day

  Average day, excluding holiday

  Average weekday

  Average weekday, excluding holiday

  Average weekend

  Average weekend including weekday holidays

  Average weekend, excluding holidays

  Average Sunday, Monday,..., Saturday

  Weekday holiday (if available)

  - Weekend holiday (if available)
  - User-Specified Day (if available)
  - Days of maximum demands (entire period, and by time-of-use)
  - Days of supplied peaks (if available).

- Individual customer coincident demands are retrieved for class peak, over the entire period and by time-of-use. Customer load factors and diversity factors are also computed.

  The following class and sample statistics are computed from the individual customer statistics:

  - Non-coincident demand
  - Energy
  - Load factor based on maximum coincident demand
  - Load factor based on non-coincident demand
  - Diversity factor.

The above statistics are reported and written to the ELDB. For both preliminary and complete analysis, the individual customer statistics are reported and written to a sequential file.

Chapter 9

Expanding Class Level Estimates to the System Level Using the Aggregate Load Analysis Program (Y320)

Once you have computed statistics for individual rate classes, you can use the Aggregate Load Analysis Program to combine them into estimates for major customer classes and, in turn, estimates for the total system load.

The Aggregate Load Analysis Program works with any combination of rate class statistics in a single run, e.g., standard (mean-per-unit), non-stratified ratio, stratified combined ratio, stratified separate ratio, and/or 100% sample.

Topics covered are:

- **What Does the Aggregate Load Analysis Program Do?**
- **Steps for Using the Aggregate Load Analysis Program (Y320)**

What Does the Aggregate Load Analysis Program Do?

The Aggregate Load Analysis Program enables you to combine individual rate class statistics into estimates for major customer classes and, in turn, to combine the major class statistics into a set of estimates for the total system load. Other uses for the program include jurisdiction combinations, cross-study strata combinations, and expansion adjustments based on external weighting factors.

The Aggregate Load Analysis Program works with statistics produced by the Standard Load, Ratio Analysis, or 100% Sample Analysis programs, or a combination of the three. The program extracts statistics from the ELDB, aggregates them according to a fixed stratification methodology, and writes the aggregated statistics back to the ELDB for further analysis and reporting.

Aggregate Load Analysis is typically used to form hierarchical combinations similar to those illustrated in Figure 9-1: Analysis Statistics Levels. In this example, Standard Load Analysis and/or Ratio Analysis are used to provide coincident demand and energy statistics for each rate class in the utility's system. Aggregate Load Analysis is used to combine the individual rate class statistics into major customer classes, and then to combine the major customer classes into a set of system estimates.

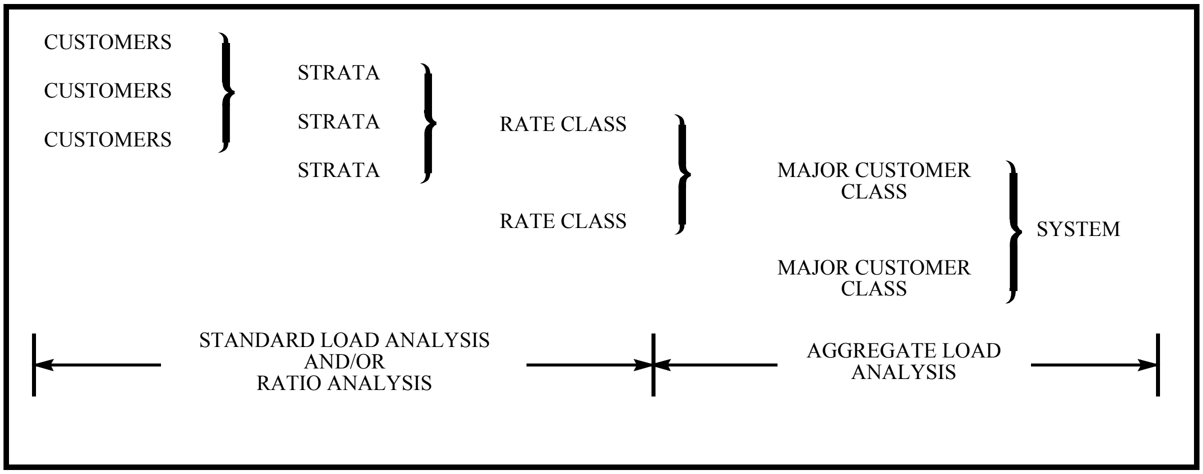


Figure 9-1 Analysis Statistics Levels

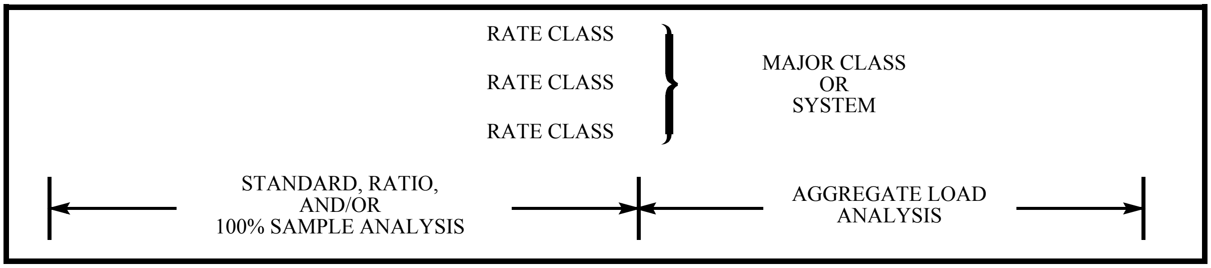


Figure 9-2 Combining 100% Sample Statistics

Aggregate Load Analysis can also be used to combine statistics from 100% Sample, Standard, and/or Ratio Analysis, as shown in Figure 9-2: Combining 100% Sample Statistics. If Standard or Ratio statistics are included, the program first combines those statistics to estimate total demand and standard error. Then the program totals the 100% Sample statistics and adds them to the above results. However, there is no additional sampling error. *Note that once 100% Sample statistics are combined and the statistics saved, these new statistics may not be used again by Aggregate Load Analysis.* For example, you may need to combine sampled and 100% commercial classes into a major class and then combine this group with others to create a system-level estimate. The system estimate run cannot use the commercial, major class statistics. The same result can be achieved by combining the separate commercial classes with the other groups to create the system estimate.

Steps for Using the Aggregate Load Analysis Program (Y320)

Here is a list of the steps you will follow when using the Aggregate Load Analysis Program. The remainder of this chapter explains each step in detail.

Summary – Using the Aggregate Load Analysis Program (Y320)

1. Make sure that the statistics you wish to aggregate are available in the ELDB.
2. Create the Aggregate Load Analysis Control File (TGY32A.CTL) – list(s) of the strata or class statistics to be combined, and other analysis parameters. You can identify a number of groups for analysis in a single file.
3. Create the Aggregate Load Analysis Environment File (TGY32B.ENV) – a group of commands that you use to set the analysis and reporting options.
4. Run the Aggregate Load Analysis Program (Y320).

Figure 9-3: Overview of the Aggregate Load Analysis Program summarizes the inputs you must provide and the outputs you can expect.

Note: The Y310 program supports pre-process key generator. See **Using the Preprocess Key Generator in a Control File** on page 4-4 for more information.

Step 1: Ensure the Statistics you Aggregate are Available in the ELDB

Remember, you can aggregate strata-, sample-, and/or 100% Sample-level statistics that exist in the ELDB.

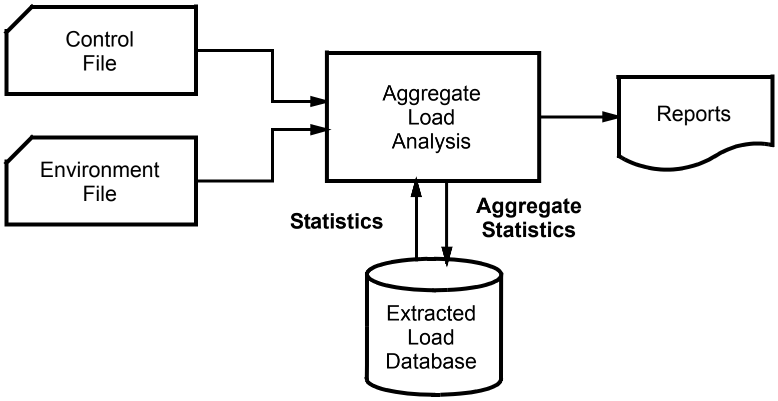


Figure 9-3 Overview of the Aggregate Load Analysis Program

Step 2: Create the Aggregate Load Analysis Control File (TGY32A)

You create the Aggregate Load Analysis Control File by assembling blocks of data — each block identifying a group of strata or class statistics that you wish to combine using Aggregate Analysis.

One Control File can contain any number of blocks. Create each block according to the format defined in the box below. Input one command and its parameters per line. Only the first three letters of each command keyword are required. You can use blanks and/or a comma to separate parameters. *You must input the commands in the order shown.*

KEY *output-key*

GROup *title*

```
GROup title

COMbine component-key1 [,type] [,strata1 | ,0 [,weight1 | ,0.0 [,factor1 | ,1.0] ] ]

COMbine component-key2 [,type] [,strata2 | ,0 [,weight2 | ,0.0 [,factor2 | ,1.0] ] ]

COMbine component-keyN [,type] [,strataN | ,0 [,weightN | ,0.0 [,factorN | ,1.0] ] ]

100%—component-key N+1 [,factorN+1 | 1.0]

END
```

- **Key** — This code will become the prefix in the statistics name that Oracle Utilities Load Analysis will assign to the new ELDB statistics. (See *Statistics Identifiers* on page 3-8).
- You can use up to 40 characters. A combination of characters (A - Z) and digits (0 - 9) may be used, but special characters (anything that is not a letter or number) are not allowed. The identifier must start with an alphabetic character. The default key is "STAR".
- **Group** — Use the Group Command to designate a title that will appear at the top of each analysis report for the block. The maximum length allowed is 76 characters per title. If you supply two Group commands, the titles will appear on two successive title lines in the sequence given. If you omit the command, no group title will appear.
- **Combine** — Input one Combine Command for each set of class or strata statistics you want included in a group analysis. ***Note:*** The Combine Command applies to statistics from a previous Standard, Ratio, or Aggregate Load Analysis run. Statistics from a 100% Sample Analysis run are not accepted by this command (use 100% instead). Each block must contain at least two Combine and/or 100% commands in any combination (e.g., two of either type or one of each), and all commands in the block must be for compatible statistics. (That is, the statistics to be combined must all have been created over the same date range and using the same Time-Of-Use and Holiday File.) Up to 99 Combine and/or 100% commands may be specified in a block. For a Combine Command, you must supply the following parameters:

  component-key — Input the statistics name prefix for the statistics group to be aggregated. ***Note:*** *A component key is usually a 4-character prefix* (e.g., 'STAR') and the parameter "strata" (supplied later in the command) is *usually '0' (zero);* this type of component/strata combination indicates that sample-level statistics are to be used as input. However, if strata-level statistics from Standard Load or Ratio Analysis are desired as input, the "component-key" and "strata" parameters may appear as follows:

  If *less than 10 strata* were used in the Standard Load Analysis or Ratio Analysi run, "component-key" must be specified as a *4- to 6-character code* and *"strata" must be an integer between 1 and 9*, inclusive, e.g., 'STAR, 2'. If *10 or more strata* were used in the Standard Load Analysis or Ratio Analysis run, the "component-key" must be specified as a *7- to 9-character code* and *"strata" must be 0 (zero)*; e.g., 'STAR-02,0'.

  type — Indicate the statistics' type (determined by the analysis methodology used to produce them). Select from these four options:

  RATio — non-stratified ratio

  COMbined – stratified combined ratio

  SEParate — stratified separate ratio

  STAndard — standard mean-per-unit or aggregate.

  Any one of these four types can be specified. However, for Aggregate Analysis to work properly, the *two or more analyses combined must be compatible.* That is, they should *all be stratified analyses with the same number of strata,* or *all non-stratified analyses.* If type is omitted, the type option defaults to "STANDARD".

  strata — Input a "0", unless you are combining strata-level statistics from a Standard Load or Ratio Analysis. In that case, enter the appropriate number. (***Note:*** If there are 10 or more strata, the strata-number automatically will be included in the prefix, and you should input a "0" for this parameter.)

weight — An optional weighting factor specified as a *non-negative floating point number less than 1.0*; the default value of 0.0 directs the program to compute the weights based on relative component population values stored with the load statistics in the ELDB.

factor — An optional adjustment factor specified as a positive floating point number. The default value is 1.0 (no adjustment).

- **100%** — The 100% Command specifies a single component code prefix for ELDB statistics from a previous 100% Sample Analysis run. Statistics from Standard, Ratio, or Aggregate Analysis runs may not be specified in this command. The parameter "100%-component-key" is a 4- to 6-character prefix (e.g., "STA100").

  The parameter "factor" is an optional adjustment factor specified as a positive floating point number; the default value is 1.0 (no adjustment). Between two and ninety-nine 100% and/or COMBINE Commands must appear in an analysis block.

- **End** — The End Command completes an analysis block, and is required.

Figure 9-4: Sample Aggregate Analysis Control File and Figure 9-5: Another Sample Aggregate Analysis Control File show two sample Aggregate Analysis Control Files. The first contains three analysis blocks. Each block illustrates how different types of statistics can be aggregated together. The first block (TOTL) combines sample-level statistics from an individual Standard Load Analysis run on a residential all-electric heating class (RAEH) and a Combined Ratio Analysis run on a residential hot-water heating class (RHWH). The second block recombines strata-level statistics from three strata in the all-electric heating class, using ratio expansion adjustments. The third block combines strata 1, 2, and 15 from an industrial class (INDL); strata 1, 2, and 3 from a commercial class (CMCL); two large general service groups that are 100% sampled; and the combined residential class from the first analysis block (TOTL). ***Note:*** A combined class that includes 100% Sample Analysis components may not be recombined with other classes in a subsequent analysis block.

BLOCK 1

```
KEY     TOTL/* COMBINE RAEH AND RHWH
GRO     TOTAL RESIDENTIAL RATE/* AND STORE WITH PREFIX TOTAL
COM     RAEH STA
COM     RHWH COM
END
```

BLOCK 2

```
KEY     TEST/* COMBINE RAEH CHANNELS
GRO     RATIO EXPANSION EXAMPLE/* 1, 2 AND 3 AND STORE
COM     RAEH, 1, 0.0, 1.21/* WITH PREFIX TEST
COM     RAEH, 2, 0.0, 0.85
COM     RAEH, 3, 0.0, 1.17
END
```

BLOCK 3

```
KEY     XMPL
GRO     TOTAL SYSTEM INCLUDING 100% SAMPLED CLASSES
COM     INDL-01, 0
COM     INDL-02, 0/* COMBINE INDL CHANNELS
COM     INDL-15, 0/* 1, 2 AND 15, CMCL
COM     CMCL,   1/* CHANNELS 1, 2 AND 3,
COM     CMCL,   2/* AND LGS1 and LGS2 100% STATISTICS
COM     CMCL,   3
100%    LGS1,   1.0
100%    LGS2    1.0
COM     TOTL,   0
END
```

Figure 9-4 Sample Aggregate Analysis Control File

```
KEY     TUTRL
GRO     TUTORIAL SAMPLE FOR AGGREGATE LOAD ANALYSIS
COM     RESI, SEP, 1, 0.0, 1.21
COM     RESI, SEP, 2, 0.0, 0.85
COM     RESI, SEP, 3, 0.0, 1.17
END
```

Figure 9-5 Another Sample Aggregate Analysis Control File

This file shows how Separate Estimator ("SEP") statistics can be combined.

Step 3: Create the Aggregate Load Analysis Environment File (TGY32B)

You use the Aggregate Load Analysis Environment File to set the analysis and reporting options for the program run.

Create the file according to the format shown in the box below. Input one command and its parameter(s) per line. Only the first three letters of each command keyword are required. You can use blanks and/or a comma to separate parameters.

DATe *start-date*

PEAk *peak-time*

ALPha [5% **|** 10%]

REPort [**NOEvaluation** | **COMplete**] [**ENTire**][**AVErage**][**PEAk**][**MINimum**] [**NCD**] [**ENErgy**] [**FACtor**]

SCHedule [*t* | 0] [**NOPrint** | **PRInt**]

SEAson [*s* | 0] [**NOPrint** | **PRInt**]

WRIte [**NO** | **COMplete**] [**ENTire**][**AVErage**][**PEAk**][**MINimum**] [**NCD**] [**ENErgy**] [**FACtor**]

DATe *start-date*

- **Date** — Use this required command to establish the start of the analysis period, using the "mm/dd/yy" format. Because the analysis period always consists of whole days, you do not need to enter the start-time (it will automatically be "00:00:00"). Oracle Utilities Load Analysis computes the stop-time from the statistical records in the ELDB.

  With Client/Server Oracle Utilities Load Analysis, the date range cannot exceed one year for 900-second data.

PEAk *peak-time*

- **Peak** — Use this optional command to input the date and time of known peaks of interest, such as the system peaks and class peaks. Use one command for each supplied peak; you can input up to 25 peaks. You must use the "mm/dd/yy-hh:mm:ss" format. If you do not enter a Peak Command, the program will assume no peaks.

ALPha [5% **|** 10%]

- **Alpha** — This command indicates the significance level of the t-statistic used in the computation of relative precision. The level of significance is expressed as a percentage — either 5% or 10%. The percent sign (%) is optional. 10% is the default.

REPort [**NOEvaluation** | **COMplete**] [**ENTire**][**AVErage**][**PEAk**][**MINimum**] [**NCD**] [**ENErgy**] [**FACtor**]

- **Schedule** — Use this command to select a single schedule from the Time-of-Use File (TGY31D.TOU) for the time-of-use calculations for Coincident Demands only. The parameter “t” is a non-negative integer representing a particular schedule in the file. The default, “SCHEDULE 0”, automatically defines a single time-of-use period equal to the analysis period.

  Use the PRINT option if you want to print graphs of the time-of-use periods as part of the Analysis Environment Report; use the NOPRINT option if you do not want a hard copy of the graphs. The default is NOPRINT.

  Note: This command cannot be used when analyzing data with an SPI of 86400.

  Note about the Time-Of-Use File: Instructions for modifying or adding new schedules to the Time-Of-Use Schedule File are provided in Step 4 of *Chapter 7: Expanding Load Data to Class-Level Estimates Using the Load Analysis Programs (Y310 and Y330)*. It is very important to keep in mind that any schedule you select must cover the entire analysis period. If the program encounters a gap, it will stop processing and issue a warning message.

SCHedule [*t* | 0] [**NOPrint** | **PRInt**]

- **Season** — Use this command to select a schedule from the Season File (TGY31E.SEA). Specifying a Season Schedule makes it possible to apply different Time-Of-Use schedules to different portions of the analysis period for computing Coincident Demands.

  The parameter “s” is a non-negative integer representing a particular season schedule within the Season Schedule File. The default, “SEASON 0”, indicates that a single Time-Of-Use Schedule, as specified in the SCHEDULE Command, is to be applied over the entire analysis period.

  The PRINT option indicates that graphs of time-of-use periods are to be printed with the Analysis Environment Report; the NOPRINT option suppresses the printing of these graphs. The default is PRINT.

  Note: Either the Season Command or the Schedule Command may be used to define time-of-use periods for Coincident Demands, but not both. If you include both commands in the Environment File, the program will use the Season Command and disregard the Schedule Command. If you include neither command, the default is “SCHEDULE 0, NOPRINT”. Either command is used only for computing Coincident Demands over time-of-use periods.

  Note: This command cannot be used when analyzing data with an SPI of 86400.

  About the Season File: Instructions for modifying or adding new schedules to the Season Schedule File are provided in Step 5 of *Chapter 7: Expanding Load Data to Class-Level Estimates Using the Load Analysis Programs (Y310 and Y330)*. It is very important to keep in mind that any schedule you select must cover the entire analysis period. If the program encounters a gap, it will abort processing and issue an error message.

SEAson [*s* | 0] [**NOPrint** | **PRInt**]

- **Report** — Use the primary options of this command (NOE and COM) to specify which groups of statistics Oracle Utilities Load Analysis should calculate and report. Use the secondary options (ENT, etc.) if you wish to further limit which reports are printed.

  NOEvaluation — This option suppresses the printing of all components of the Sample Evaluation Reports. Because these reports tend to be very lengthy, this option can substantially reduce the size of the hard copy output. Use this option when you want only the major statistics and analysis environment reports.

  COMplete — Select this option to calculate all statistics and print *all* reports available with the Aggregate Load Analysis Program. REPORT COMPLETE is the default.

  Use the secondary options to print only selected reports. The program will still calculate all statistics based on your input for the primary options, but only the specified report(s) will be printed. For example, if you want to calculate all statistics but print only the Energy Report, use this command: “REP COM ENE”.

  ENTire — prints the Entire Period Sample Evaluation Report: TGY321-03.

  AVErage — prints all average day type evaluation reports: TGY321-10 through TGY321-25.

  PEAk — prints all peak day and supplied peak evaluation reports: TGY321-27 through TGY321-XX.

  MINimum — prints all minimum day reports: TGY321-28 through TGY321-XX.

  NCD — prints the Noncoincident Demand Report: TGY321-30.

  ENErgy — prints the Energy Report: TGY321-40.

  FACtor — prints the Load Factors Diversity Factor and Coincidence Factor reports: TGY321-50, 60, 70, 80.

WRIte [**NO** | **COMplete**] [**ENTire**][**AVErage**][**PEAk**][**MINimum**] [**NCD**] [**ENErgy**] [**FACtor**]

- **Write** — Use this command to determine which statistics, if any, should be written back to the ELDB.

  NO — With this option, no statistical records are written back to the ELDB, even if you specify any of the secondary Write options (ENT, etc.). You should use this option when you need just the hard copy output reports.

  COMplete — The COMPLETE option writes all statistical records produced by the analysis run back to the ELDB. This is the default. If you wish to write just a few statistics to the database, use “Complete” and one or more of the secondary options described below.

  Use the secondary options in conjunction with the “Complete” option to write only selected statistics. The program will still calculate all the statistics based on your input for the primary options, but only the specified statistics will be written to the ELDB

  ENTire — writes all Entire Period statistics

  AVErage — writes all average day type statistics, such as average weekday

  PEAk — writes all statistics for peak day and user-supplied peak days

  MINimum – writes all minimum day statistics

  NCD — writes Maximum Noncoincident Demand Statistics

  ENErgy — writes energy statistics

  FACtor — writes statistics corresponding to Load, Diversity, and Coincidence Factors.

```
5DAT      05/01/99
WRI       COM
REP       COM
ALP       10%
```

Figure 9-6 Sample Aggregate Analysis Environment File

Step 4: Run the Aggregate Load Analysis Program (Y320)

Once you have created the Control and Environment files, you are ready to run the Analysis Program. Use Y320.

Aggregate Analysis Processing

The Aggregate Load Analysis Program initially examines the Environment File for errors and reports fatal errors with a diagnostic message. Those environment parameters that are not specified are assigned default values. The contents of the Environment File apply to all subsequent analyses.

The program then processes analysis blocks in the Control File. A block is defined by a KEY Command, an optional GROUP Command, *between 2 and 99 COMBINE* and/or 100% commands, and a single END Command. Illegal commands and errors are noted with a diagnostic message; if errors are found, the block is discarded and processing resumes with the next block.

For each valid analysis block, the program extracts certain statistical records in the ELDB for the indicated components, aggregates the statistics using the methodology presented in *Appendix B: Analysis Equations*, and writes the aggregated statistics back to the ELDB using the key specified in the KEY Command.

The Aggregate Load Analysis Program will attempt to calculate the following load statistics:

- Average day demands
- Average day demands, excluding holiday
- Average weekday demands
- Average weekday demands, excluding holiday
- Coincident demands over the entire period
- Average weekend demands
- Average weekend demands, excluding holidays
- Average day-of-the-week demands
- Average weekday holiday demands
- Average weekend holiday demands
- Average weekend including weekday holiday demands
- Average User-Specified Day (if available)
- Day of supplied peak demands
- Total energy, by time-of-use
- Non-coincident demand, by time-of-use
- Load factor for non-coincident demand
- Load factors for maximum coincident demand and for demand at time of supplied peaks
- Diversity factors for maximum coincident demand and for demand at time of supplied peaks

- Coincidence factors for maximum coincident demand and for demand at time of supplied peaks.

The steps required to develop the above load statistics depend upon the mode of analysis. The Sample Only mode occurs when only Combine commands are used in the command block and all statistics are from sampled classes. The 100% mode occurs when one or more 100% commands are used in a command block, with or without Combine commands. Following is a discussion of the processing logic within each mode.

The ELDB statistics required in the Sample Only mode consist of the sample mean, standard error of the sample mean, and sample size for each component prefix. Consider, for example, the following analysis block:

```
KEY     TOTL
COM     RAEH STA
COM     RHWH COM
END
```

The first statistic that the program will attempt to derive is coincident demand statistics over the entire period. The following components are required.

- RAEH-ENTR-MEAN,0
- RAEH-ENTR-SESM,0
- RAEH-ENTR-SIZE,0
- RHWH-ENTR-CMEN,0
- RHWH-ENTR-SECM,0
- RHWH-ENTR-SIZE,0.

The above keys are automatically reconstructed by the program, retrieved from the ELDB, and combined to form:

- Aggregate mean
- Standard error of aggregate mean
- Degrees of freedom
- Relative precision
- Sample size.

The computations are based on the analysis equations that appear in *Appendix B: Analysis Equations*. Ratio expansion adjustments are automatically applied to the weights before the computations.

Each statistic computed by Aggregate Analysis is written to the ELDB using the code prefix specified by the KEY Command in the analysis block. In the example shown in Figure 9-4: Sample Aggregate Analysis Control File, the following keys are used to write out the statistics.

TOTL-ENTR-MEAN, 0

TOTL-ENTR-SESM, 0

TOTL-ENTR-PREC, 0

TOTL-ENTR-SIZE, 0.

These statistics may be reported, graphed, stored, and/or analyzed in the usual fashion.

The 100% mode processing includes the above discussion, if the Combine and 100% commands are included in the same command block. All Combine commands are processed first to determine the population, total load, and the standard error based on sampled classes. Next, the

100% commands are processed to determine their population by time interval and total load. In the following example, a large general-service class is added to the two residential classes:

```
KEY     RLGS
COM     RAEH STA
COM     RHWH COM
100     LGS1
END
```

Two component statistics are read from the ELDB:

- LGS1-ENTR-TOTL
- LGS1-ENTR-SIZE.

The 100% totals are calculated as shown in *Appendix B*: *Analysis Equations*, and then added to the sampled totals to create four statistics.

- Total demand
- Standard error of the total
- Sample size
- Population.

Each statistic computed by Aggregate Analysis is written to the ELDB using the code prefix specified by the Key Command in the analysis block. In the previous example, the following keys are used to write out the statistics:

- RLGS-ENTR-TOTL
- RLGS-ENTR-SETL
- RLGS-ENTR-SIZE
- RLGS-ENTR-POPL.

These statistics may be reported, graphed, and stored in the usual fashion. However, because they represent an aggregation of sampled and 100% groups, they may *not* be aggregated again. If there are only 100% commands, then the sampling error is zero and both the reports and SETL statistics reflect zero values.

Chapter 10

Estimating Average Peak Load Using the Coincident Peak Analysis Program (Y340)

In addition to the standard Oracle Utilities Load Analysis analysis package, your utility may have one or more of the optional extensions offered by Oracle Corporation. In this chapter we will look at the **Coincident Peak Analysis Program**. This program enables you to calculate the estimate of the mean and corresponding sampling error of up to twelve periods of coincident peak demands for a customer class. Topics covered in this chapter include:

- **What Does the Coincident Peak Analysis Program Do?**
- **Steps for Using the Coincident Peak Analysis Program (Y340)**

What Does the Coincident Peak Analysis Program Do?

Coincident peak analysis is a powerful methodology for determining the responsibility of a rate class when allocating costs. Often the allocation of costs to a rate class is done using statistics that reflect just one hour of demand, such as maximum coincident demand at the time of system peak, or maximum non-coincident demand. The problem with these statistics is their concentration on one hour of the year to the exclusion of all others. Coincident peak analysis provides the capability to combine the contributions of special hours into a more representative measure upon which to allocate. The hours included may represent **monthly peaks for the year**, or a **subset of months corresponding to seasonal peaks**.

The Oracle Utilities Load Analysis **Coincident Peak Analysis Program** can be used to calculate the estimate of the mean and corresponding sampling error of *up to 12 periods* of coincident peak demands for a specified class of customers. (See Figure 10-1: Coincident Peak Analysis.) The estimates may be calculated with either of two techniques: *mean-per-unit* or *combined ratio estimation*. Both are sophisticated analysis techniques that yield results at the class and average customer levels. (See the beginning of *Chapter 7: Expanding Load Data to Class-Level Estimates Using the Load Analysis Programs (Y310 and Y330)* for a discussion of the differences between the mean-per-unit and combined ratio expansion methodologies.) You can even request that the program perform both types of analysis in a single run.

> **Note:** Combined ratio estimation requires accurate billed energy values for the entire customer class population, broken down by analysis sub-period. It is also helpful to have billed energy values for each customer in the sample, by sub-period, but that is not a requirement.

The Coincident Peak Analysis Program offers several additional options, giving you greater control over the analysis — including analysis of stratified or non-stratified samples; the ability to filter interval data by quality; the option to use data from either the ALDB or ELDB, or both; and the capability to adjust for changing strata populations.

The results of the computations are eight output reports: an Environment Report, an Individual Customer Definition Report, a Strata Statistics Matrix Report by strata, a Variance/Covariance Matrix Report, two Coincident Peak reports, an optional Customer Error Report, and an optional Strata Population/Weight Update Report.

Steps for Using the Coincident Peak Analysis Program (Y340)

Here is a list of the steps you will follow when using this program. The remainder of this chapter explains each step in detail.

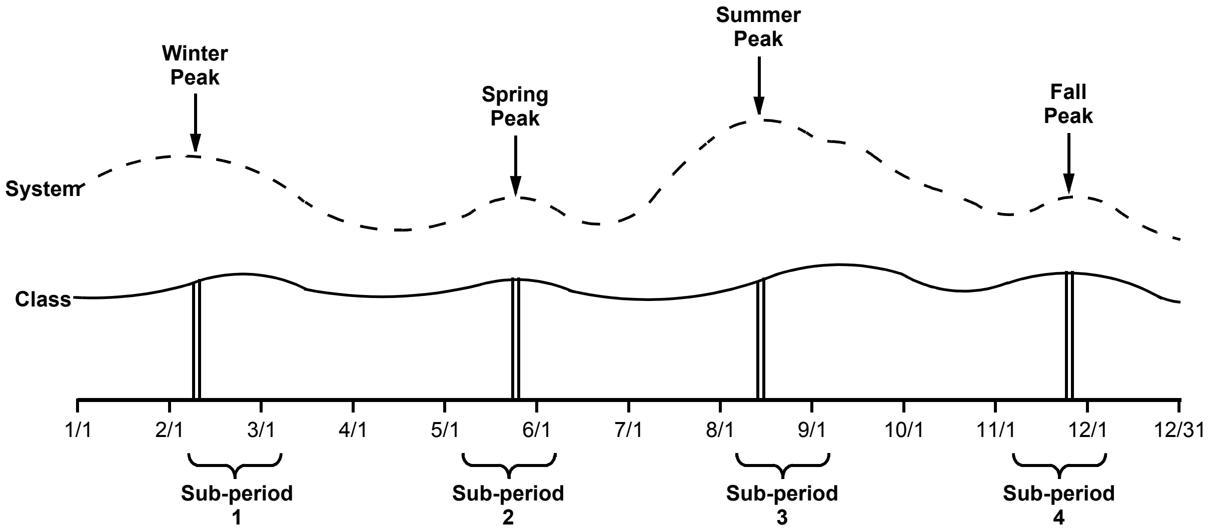


Figure 10-1 Coincident Peak Analysis

For cost allocation, it is desirable to estimate the contribution of each class to the system peak. When an average of several peaks is required, Coincident Peak Analysis can provide the average of up to twelve peaks, and confidence intervals for the estimate. This figure illustrates a system load with four seasonal system peaks. These times were chosen to compute the coincident peak statistics for a customer class. In addition, we define sub-periods, or calendar ranges, for each peak using "breakpoints." These sub-periods can be used to automatically calculate an estimate of customer billed energy for Ratio Analysis if bills are not available.

Summary - Using the Coincident Peak Analysis Program (Y340)

1. Make sure that the interval data you wish to analyze is available in the ALDB and/or the ELDB.
2. Create the Coincident Peak Analysis Control File (TGY34A.CTL) — a list of the customers to be analyzed and, if performing Ratio Analysis, the billed-energy for each customer for each sub-period in the analysis.
3. Create the Coincident Peak Analysis Environment File (TGY34B.ENV) — a group of commands that you use to set analysis and reporting options.
4. Run the Coincident Peak Analysis Program (Y340).

Figure 10-2: Overview of the Coincident Peak Analysis Program summarizes the inputs you must provide and the outputs you can expect.

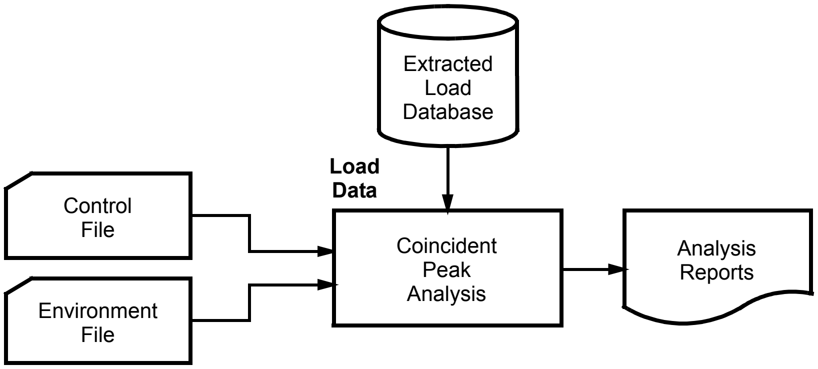


Figure 10-2 Overview of the Coincident Peak Analysis Program

Step 1: Ensure Data You Analyze is Available in Either the ALDB or the ELDB

The Coincident Peak Analysis Program allows you to analyze interval data for a customer class for *any number of whole days from two days up to a year*. Before running the analysis, it is a good idea to check that either the ELDB and/or the ALDB contains reliable load data for the customers in the analysis group over the desired analysis period. You may wish to run one of the database Summary Reporter programs to verify that the data is available.

> The Coincident Peak Analysis Environment File allows you to specify the source of data as either the ALDB or ELDB, or both. If you specify both, the program will go to the ALDB first, then the ELDB. If data for the same time period exists in both places, the program will use the data from the ELDB.

Step 2: Create the Coincident Peak Analysis Control File (TGY34A.CTL)

The Control File consists of a list of keys identifying the customers to be analyzed, along with additional values that depend upon the type of analysis to be performed (mean-per-unit, combined ratio, or both).

There are three methods for creating a Coincident Peak Analysis Control File: using a Key Generator Program, using the Customer Data Extraction Program, or typing the file manually. (Instructions for using the Key Generator or Customer Data Extraction programs are provided later in this manual.)

No matter which approach you use, the file must be constructed of a series of control records that conform to the format shown in the box below and in Table 10-1. You may input blank spaces or a comma between elements in a record, with the exception that blanks are not allowed before or after an operator if combining channels. Do **not** put blank lines between records. As explained later in this section, the order of the records is important, and must be in ascending order by customer-id and period-number. *You can input any number of customer records in a single Control File.*

> **Important Note:** The number of records in the file will depend upon which type of analysis you wish to perform. For a Mean-Per-Unit Analysis, the total number of records equals the number of customers (e.g., sample points) in the analysis. If you wish to perform a Ratio Analysis (or both ratio and mean-per-unit), each customer must have a separate record for each analysis sub-period. In other words, the total number of records for a Ratio Analysis equals the product of the number of customers in the analysis and the number of sub-periods. For your information, the Ratio Analysis Program requires separate customer records for each sub-period because it must associate each customer with its billed-energy for the sub-period.

If you intend to select both types of analysis, follow the format and instructions for a Ratio Analysis.

Control File Record Format for Mean-Per-Unit Analysis:

customer-id chan1 [{±}*chan2* [{±}*chan3*...[{±}*chann*]]] [*stratum-number*]

Control File Record Format For Combined Ratio Analysis, or Both:

customer-id chan1 [{±}*chan2* [{±}*chan3*...[{±}*chann*]]][*stratum-number*] [*customer-billed-energy*][*period-number*]

- **customer-id** — enter the Oracle Utilities Load Analysis customer-id. *Required.*
- **chan1, chan2...chanx** — enter the channel-number or a combination of channels for that customer-id. *At least one channel-number per record is required.*

A combination consists of two or more channels added or subtracted to represent the total customer load. For example, 1+2-7 might be used to represent the sum of channels 1 and 2 minus channel 7, a co-generation unit. Do not add blanks before or after an operator. ***Note:*** The data is combined strictly for the analysis; no new records are created.

When deciding whether or not to combine channel-numbers, it is important to remember that each record in the Control File represents one sample point in the analysis. If you are analyzing end-uses, it would be appropriate to keep channel-numbers separate. If you are analyzing total premise loads, you would typically combine the channel-numbers for a large customer into a single record. (***Note:*** If you want to combine multiple customer-ids into a single sample point, you cannot do that in the Control File. You must instead use the Load Data Transformation Program, Y620, before analysis.)

- **strata-number** — enter the stratum number to which the customer belongs. *Required for either type of analysis.*
- **customer-billed-energy** — *for Ratio Analysis* — enter the amount of energy for which the customer was billed for the analysis sub-period. (The particular analysis sub-period is identified with the next parameter in the command, as described below.) The billed-energy value should come from “billing.” Enter it as a positive floating point number.

If you cannot provide accurate billed energy values for the customers in the analysis, you can have the program calculate the values from the interval data. To do this, you **must** provide two pieces of information in the Environment File: 1) select the BILLING NO option; and 2) identify the date range of each analysis sub-period using “breakpoints” (explained later in this chapter). Also, *be sure to provide a zero or other value in the Control File record as a place-holder* (it will not be used in the calculations).

Alternatively, if you are missing just a few values, you can direct the program to drop customers for just specific sub-periods. That is, if a customer has an unacceptable or missing billed-energy value for a particular sub-period, you may insert a negative integer for billed-energy in the Control File to indicate the situation. Doing this will cause the customer’s data contribution to be dropped from the analysis *for that sub-period only.*

If you are performing a Ratio Analysis, all Control File records must include a billed-energy value (even if it is just a place-holder) and an associated period number. If the program finds any missing values, they will be considered a fatal error and the program will terminate processing.

- **period-number** — *required for Ratio Analysis* — a positive integer that identifies a sub-period in the analysis. The customer billed-energy value you supplied in the previous parameter in the record must belong to this sub-period.

If you do not supply a period number for each record in a Ratio Analysis, the program will abort processing.

To obtain a better understanding of the organization of a typical Control File, consider the following two examples. The first example (Figure 10-3: Sample Control File for Stratified, Mean-Per-Unit Analysis) is for a *stratified mean-per-unit* analysis consisting of three strata for two periods.

The Control File contains six customers, five of which have combined channels. There are two customers for each of the three strata. Note the absence of billed energy values and period numbers. These could be included without harm, but need not be because the analysis is mean-per-unit.

Table 10-1: Control File Record Description

FIELD NAME	LENGTH	DATA TYPE
Customer-id	1 - 64	Character
Channel(s)	1 - 200	Character
Strata Number	1 - 2	Character
Billed Energy	11	Fixed (11.2)
Period Number	3	Fixed (3)

```
A001    1+2-3+411
A002    1+2+3   1
A003    1       2
A004    1-2-3   2
A005    1-3     3
A006    1+2     3
```

Figure 10-3 Sample Control File for Stratified, Mean-Per-Unit Analysis

The second example is for a *stratified combined ratio analysis* consisting of three strata for two periods (Figure 10-4: Sample Control File for a Stratified Combined Ratio Analysis).

```
A001    1+2-3+41250.0   1
A001    1+2-3+41300.0   2
A002    1+2+31  150.0   1
A002    1+2+31  175.0   2
A003    1 2     195.0   1
A003    1 2     210.0   2
A004    1-2-32  230.0   1
A004    1-2-32  250.0   2
A005    1-33    330.0   1
A005    1-33    350.0   2
A006    1+23    305.0   1
A006    1+23    315.0   2
```

Figure 10-4 Sample Control File for a Stratified Combined Ratio Analysis

In this Control File, billed energy values and period numbers must be included or the analysis will terminate.

Step 3: Create the Coincident Peak Analysis Environment File (TGY34B.ENV)

You use the Analysis Environment File to specify the conditions under which you want the analysis to be performed and reported.

The file is made up of the commands summarized in below. When creating the file, enter one command per line. Each line must begin with the command name (keyword); but you need enter only the first three letters of the keyword. You may enter the commands in any order. If you do not specify a command, the program will assume the default (underlined). Following is a detailed description of each command. The commands are described in the order in which they appear in below. An example Environment File is shown in Figure 10-5: Sample Coincident Peak Analysis Environment File for a Stratified Ratio Analysis.

TYPe [**MPU** | **RATio** | **BOTh**]

DATe *start-date* s*top-date*

BREakpoints *brkpt1 brkpt2... brkptN*

PEAk1 *peak-time*, [*population billed energy*] [*d%*] [*w#*]

PEAk2 *peak-time*, [*population billed energy*] [*d%*] [*w#*]
...

PEAkn *peak-time*, [*population billed energy*] [*d%*] [*w#*]

STRata *Strata-number peak-period-number* [*bound* | **INF** [*population* | 0 [*weight* | 0.0]]]

SOUrce [**BOTH** | **ELDB** | **ALDB**]

QUAlity ['*q*' | '8']

DROp [*d%* | 100%]

BILling [**NO** | **YES**]

GROup *title of customer class*

PERiod *title of analysis period*

REPort [**NOStrata** | **NOVarcov** | **COMplete**]

TYPe [**MPU** | **RATio** | **BOTh**]

- **Type** — Indicates the kind of analysis to be performed. The choices are MPU (mean-per-unit), RATIO (combined ratio), or BOTH. If you omit this command, the program automatically performs both types.

  Note: If you specify BOTH, you must construct the Environment File as though you were performing a Ratio Analysis.

DATe *start-date* s*top-date*

- **Date** (required) — establishes the analysis period. Both dates must be specified in the format "mm/dd/yy". The date range can cover any period of time from two days up to a year. Note that all peak-times specified for analysis using the Peak Command (described later in this section) must fall between these two dates.

BREakpoints *brkpt1 brkpt2... brkptN*

- **Breakpoints** (*required only if you are performing Ratio Analysis and want the program to calculate customer billed energy; e.g., you are not providing customer billed energy values in the Control File*) — defines the sub-periods into which the analysis period is broken, so that the program can calculate customer billed energy from the interval data in each sub-period.

  The supplied breakpoints divide the analysis period into (n+1) sub-periods corresponding to the (n) dates entered here, and the beginning and ending dates of the total analysis date range specified in the Date Command. You must specify each breakpoint in the format "mm/dd/yy". Also, you need to specify at least one breakpoint if you are using this command, because at least two peaks are necessary for Coincident Peak Analysis.

  The breakpoints represent the first day of a new sub-period within the analysis period. Therefore, the first sub-period begins on the start-date of the DATE Command and ends on the day before the nearest breakpoint date. The second sub-period starts on the breakpoint date and covers the days until the day before the next closest breakpoint date. This process continues until all breakpoints are exhausted. Breakpoints can be given in any order. *They must all fall between the date range set in the Date Command, and no sub-period can have more than one peak fall within it.* If either of these conditions is not met, the program will write an error message and will terminate processing. However, not all sub-periods need have a peak within their bounds. *Any number of breakpoints can be entered as long as the above two conditions are met. Only those sub-periods that include a peak value are included in the analysis.*

  If more breakpoints than will fit on one record (card image) are needed, other records containing breakpoints may be added, provided they each begin with the keyword "BREakpoints" and immediately follow one another.

PEAk1 *peak-time*, [*population billed energy*] [*d*%] [*w*#]

PEAk2 *peak-time*, [*population billed energy*] [*d*%] [*w*#]

PEAkn *peak-time*, [*population billed energy*] [*d*%] [*w*#]

- **Peak** — indicates the date and time of externally determined coincident peaks for the customer class under analysis, along with some optional information.

  One Peak Command must be supplied for each individual coincident peak period in the analysis. *Up to 12 peaks may be specified.* The peaks need not be supplied in chronological order. *However, they must all fall within the date range of the Date Command, and no more than one peak may fall within a sub-period.* (The sub-periods are defined using the Breakpoint Command.) Each Peak Command is made up of the keyword PEAk and values for the following parameters:

  peak-time must be specified in the format "mm/dd/yy-hh:mm:ss".

  population-billed-energy is required for a Ratio Analysis. It is the sum of the billed-energy for the class population for the sub-period in which the peak occurred. Billed-energy values can be any positive real number.

  drop% is optional. It specifies the percentage of data missing or data excluded for quality reasons, above which a customer's data contribution to that sub-period peak is dropped. For example, if you specify 50%, and a customer has missing values for 60% of the intervals expected over a given sub-period, the program would drop the customer from that sub-period's peak calculation.

  The number entered must be a non-negative integer between zero (0) and one hundred (100), inclusive. *The value entered must be immediately followed by a percent sign (%). Failure to include the percent sign will be treated as an error.* This is necessary to distinguish the drop criteria from the optional billed energy. If you do not specify a drop-percentage in the Peak Command, the default will be that value given in the Drop Command.

peak-weight# is also optional. This value specifies the weighting to be given to each peak. The number entered must be a non-negative real number between 0 and 1. If you do not supply a weight value for a peak, the peak's weight will default to 1 divided by the number of peaks. If no weights are entered in the file, each peak will equal 1 divided by the number of peaks. *The value entered must be immediately followed by a pound symbol (#).* Failure to include the pound symbol will be treated as an error. This is necessary to distinguish the peak weight from the other optional values in the command. If the sum of the weights in the file is greater than or less than 1, the program will produce a warning message and continue processing.

STRata *Strata-number peak-period-number* [*bound* | **INF** [*population* | 0 [*weight* | 0.0]]]

- **Strata** — provides information about each stratum for each peak period. If you are performing a Non-Stratified Analysis, you will supply just one Strata Command. If you are performing a Stratified Analysis, you must provide "h" Strata commands for each peak period (where h is the total number of strata). That is, *the total number of Strata commands for a stratified analysis equals the product of the number of strata and the number of peak periods.* **Up to 99 strata may be defined.**

  Following is a description of each parameter in a Strata Command:

  stratum-number — (*required*) a positive integer from 1 to 99 identifying the stratum. Within the file, the strata must be numbered from 1 to h, where h is the total number of strata. The strata may be supplied in any order in the file, but it's a good idea to keep them in ascending order.

  peak-period-number — specifies the period in which the stratum population and optional weight should be applied. This enables you to vary the stratum population and weight by period to match the actual period population of the stratum. ***Note:*** Within the file, there must be the same number of strata in each peak period, and that number must equal the total number of strata in the analysis.

  boundary — the stratum boundary. For a stratified analysis, specify each boundary as a positive floating point number. Within the file, boundaries must appear in ascending order. *The stratum boundary of a non-stratified analysis or the last stratum boundary of a stratified analysis must be specified as INFINITY (the default).* ***Note:*** The boundary of a stratum can vary from period to period.

  population — the size of the stratum population during the peak period, or the entire population if performing a Non-Stratified Analysis. Enter the value as a non-negative integer. If you enter "0" or omit the parameter, the program will assume that the population equals the stratum sample size (100% sampling). ***Note:*** The population for a stratum can vary from period to period.

  weight — optional weighting factor for the stratum during the peak period. Your input must be a floating point number between 0.0 and 1.0. If you input zero (0.0) or do not supply a weight, the program will assign a weight based on the stratum population. ***Note:*** The weight assigned to a stratum can vary from period to period.

  > **Note:** The strata boundaries, population, and weight typically come from the original sample design.

SOUrce [**BOTH** | **ELDB** | **ALDB**]

- **Source** — specifies the database from which the data for the analysis is obtained. The source of the data can be the ELDB or ALDB, or both. If BOTH is selected, data is first read from the ALDB, followed, and possibly overridden by, the ELDB. If you omit the command, the program automatically gets the data from the ALDB.

QUAlity [‘*q*’ | ‘8’]

- **Quality** — sets the level of acceptable data quality for the analysis. Input the worst acceptable status code. The program will treat any interval with a status code worse than ‘q’ as missing. ***Note:*** The status code must be input with apostrophes (‘) on either side. The default is ‘8’ (only missing intervals are excluded).

DROp [*d*% | 100%]

- **Drop** — establishes the threshold for dropping a customer’s contribution to a sub-period peak. If a customer is missing d% or more of the expected intervals in a given sub-period (due to missing data or data excluded by the Quality Command), the program will drop the customer from that sub-period’s peak calculation. ***Note:*** The value entered here is used as the drop criterion for all sub-periods within the analysis period, unless explicitly overridden by a drop value in the corresponding Peak Command.

  The value for “d” must be a non-negative integer between 0 and 100, inclusive. The percent sign (%) is optional. The default is “100%”.

BILling [**NO** | **YES**]

- **Billing** — *for Ratio Analysis only* — specifies which set of customer energy values to apply in the calculation of ratios used in the estimation. If you specify YES, the energy used in the denominators of the ratio estimates are taken from the energy values you supplied in the Control File. To have the program automatically calculate the energy values for use in the denominators of the ratio estimates, enter NO. In that case, the program will automatically compute a billed energy value for each customer in each sub-period identified by the breakpoints in the Breakpoint Command. The default is YES.

Reminder: If you are using TYPE RATIO or TYPE BOTH and BIL NO is selected, each record in your Control File must still include a billed-energy value as a place-holder, followed by the period-number. This positional value in the Control File will be ignored in the calculations.

GROup *title of customer class*

- **Group** — assigns a title to appear at the top of each analysis report produced by the program run. Typically, you would supply a title that identifies the customer class being analyzed. You can supply one or two Group commands (one per line), for one or two titles at the top of the reports. *Each title is limited to 76 characters.* If you omit the command, the lines for the titles will be left blank.

PERiod *title of analysis period*

- **Period** — specifies an additional title for the analysis reports, which will appear below the group title(s). It is typically used to identify the date range of the analysis. You can specify a title of up to 76 characters. If you omit the command, the line for the title will be left blank.

REPort [**NOStrata** | **NOVarcov** | **COMplete**]

- **Report** — Determines whether or not certain groups of statistics are reported. The following options are available:

  NOStrata — suppresses production of the individual strata reports in the Strata Statistics Matrix Report. Under this option, the reports that are printed include the Variance/

Covariance Matrix Report and the Coincident Peak Report. This option is useful when none of the strata detail is needed. *Using this option substantially reduces the hard copy output when a large number of strata are used in the analysis.*

NOVarcov — suppresses the printing of both the Strata and Variance/Covariance Matrix reports. This option should be used when only the Coincident Peak Report is needed. *Using this option yields the minimum amount of output possible.*

COMplete — prints all reports of the program. This is the default.

An example of a Coincident Peak Analysis Environment File for a typical Stratified Ratio Analysis can be found in Figure 10-5: Sample Coincident Peak Analysis Environment File for a Stratified Ratio Analysis.

```
BREAKPOINTS   01/01/98 06/01/98 08/01/98
DATE       12/01/97 09/30/98
DROP       20%/* DROP CUST IF ≥ 20% MISSING
GROUP      LARGE INDUSTRIAL CUSTOMERS
PEAK1      12/14/97-15:59:5910%   0.4#
PEAK2      01/08/98-12:59:5925%   0.2#
PEAK3      07/22/98-13:59:5915%   0.2#
PEAK4      08/02/98-14:59:59       0.2#
PERIOD     WINTER 87 - SUMMER 88
QUALITY    'L'  /* ACCEPT QUALITY "L" OR BETTER
REPORT     COMPLETE
SOURCE     ALDB
STRATA     1 1 770 12000 0.0   /* STRATA, PEAK, BOUND POP, WEIGHT
STRATA     2 1 INF 3500.0
STRATA     1 2 840 110000.0
STRATA     2 2 INF 3300.0
STRATA     1 3 1100 125000.0
STRATA     2 3 INF 335 0.0
STRATA     1 4 1200 130000.0
STRATA     2 4 INF 3600.0
TYPE       RATIO
```

Figure 10-5 Sample Coincident Peak Analysis Environment File for a Stratified Ratio Analysis

Step 4: Run the Coincident Peak Analysis Program (Y340)

Once you have created the necessary input files, you are ready to run the program. Use Y340.

Coincident Peak Analysis Processing — Processing in the Coincident Peak Analysis Program consists of the following steps:

- The Environment File is processed. If an error is detected, the program terminates with a diagnostic.
- The Control File is processed. For each customer, the following steps are performed:

  The customer-id, channel(s), strata assignment, optional billed energy value, and optional period number are read. If a Stratified Analysis is desired, a stratum number is required and must match one of the strata specified in the Environment File. If an error is detected, the customer is dropped and processing continues with the next customer.

  The indicated channel(s) is retrieved from the ALDB and/or the ELDB for the entire period of the analysis and aggregated to hourly data, if the data's original recording frequency was less. If an aggregated interval is incomplete, it is assigned a status code of '7'. Each channel is converted to demand units and, if necessary, combined. *Combined intervals are assigned the worst of the component status codes*; incomplete combined intervals are assigned a status code of '7'. If one or more channels are missing in their entirety, the customer is dropped, and processing continues with the next customer.

- The customer's peak data is scanned for quality. If a peak interval's status code exceeds the quality code specified in the Environment File, the interval is set to zero and flagged as missing.
- The customer's combined demand array for the entire analysis period is divided into sub-periods based upon the entered breakpoints. For each sub-period including a peak value, the entire set of data is scanned for missing data or data excluded due to unacceptable quality. If the percentage of excluded data (relative to the total sub-period data) is above that peak period's drop criterion, the peak value for that period is dropped from the analysis. Testing continues with the next sub-period that includes a peak, until all sub-periods have been examined. If a customer has at least one peak value, it is included in the analysis.
- The following statistics are calculated for the peak periods in the analysis by strata:

  Mean demand (row and column)

  Standard error of the mean demand

  Correlation coefficient

  Average sample size

  Common sample size.

- Total variance/covariance statistics calculated for the peak periods in the analysis (summed over strata) are:

  The Variances of the coincident peak demands for average and customer class levels

  The Co-variances of the coincident peak demands for average and customer class levels.

- Coincident peak statistics are calculated for the peak periods in the analysis and for the entire period of analysis. These statistics are:

  Average customer-level coincident peak demand

  Variance of the average customer-level coincident peak demand

  Contribution to variance of the individual variances of the period average customer-level coincident peak demands

  Contribution to variance of the individual co-variances of the between period average customer-level coincident peak demands

  Standard error of the average customer-level coincident peak demand

  Customer class-level coincident peak demand

  Variance of the customer class-level coincident peak demand

  Contribution to variance of the individual variances of the period customer class-level coincident peak demands

  Contribution to variance of the individual co-variances of the between period customer class-level coincident peak demands

  Standard error of the customer class-level coincident peak demand.

Chapter 11

Estimating Loads for Subpopulations Using the Domains Analysis Programs (Y350 or Y360)

Domains analysis is used to study the load characteristics of subpopulations within a customer class — for example, residential customers with water heaters, or grocery stores that stay open 24 hours a day. This technique maximizes the value of existing load research data by making it possible to study subpopulations, or domains, other than those for which a sample was originally designed. It is extremely useful for rate design, demand side management, forecasting, and marketing studies.

Two optional Oracle Utilities Load Analysis extensions are available in the Analysis Bundle to perform domains analysis: the Domains Analysis Mean Per Unit Program (Y350) and the Domains Analysis Ratio Program (Y360). Both versions are described in this manual.

Topics covered in this manual:

- **The Domains Analysis Programs**
- **Steps for Using the Domains Analysis Program (Y350 or Y360)**

The Domains Analysis Programs

The Domains Analysis programs are used to compute load statistics for one or more subpopulations, or domains, within an analysis group. These subpopulations are selected from an existing load research sample, but are different from those used in designing the original sample. Two programs are available for domains analysis: Domains Analysis Mean-Per-Unit (Domains MPU) and Domains Analysis Ratio (Domains Ratio).

Both programs perform either *stratified or non-stratified analyses* and analyze a set of domains over an existing stratification scheme. *Periods of up to one year may be analyzed*, and holidays, time-of-use periods, and type-of-day definitions are incorporated. *Up to thirty-five (35) different domains* may be analyzed in one job run.

Expansion Methods

Domains MPU — Two methods of expansion are implemented by the Domains MPU Program. The preferred method is the use of *domain populations for the expansion estimates*. This requires knowledge of the population totals for each domain within each stratum, and should provide the most accurate results. The second technique is employed when populations are not known within each domain. In that case, the *expansion is performed using the total population*. The equations used for both methods are provided in *Appendix G, "Domains Analysis Mean Per Unit Equations",* in the *Oracle Utilities Load Analysis Load Data Analysis User's Guide*.

With **Domains Ratio**, stratified analysis results are calculated using the Combined Estimate technique. This estimation technique is based on the ratio of domain demand to domain energy when total billed energy is available for each domain; otherwise, the ratio of domain demand to sample energy is used to estimate the total.

Results

Both programs calculate estimates of coincident demands, non-coincident demands, and energy. For Domains MPU, these estimates are in the form of total demand based on a mean per unit structure, and are provided for the customer, strata, domain, and population levels within an analysis group. For Domains Ratio, these estimates are in the form of total demand based on a ratio estimate, and are provided for the customer, domain, and population levels within an analysis group. Domains Ratio additionally calculates load factors and diversity factors (Domains MPU does not).

Both programs produce time-of-use and type-of-day statistics. Estimates of the relative accuracy of each statistic are computed for sample evaluation. Statistics may be written to the ELDB for additional evaluation, reporting, and archiving to the SLDB. A file of individual customer statistics, which can be accessed by user programs, is also created by both programs.

Steps for Using the Domains Analysis Program (Y350 or Y360)

Here is a brief list of the steps you will follow when performing a domains analysis. The remainder of this chapter explains these steps in detail.

> **Note:** Files and reports associated with Domains MPU are identified by "TGY35_"; those associated with Domains Ratio by "TGY36_".

Note: The Y350 and Y360 programs supports pre-process key generator. See **Using the Preprocess Key Generator in a Control File** on page 4-4 for more information.

Summary — Using Domains MPU or Domains Ratio

1. Make sure that customer load data for the entire analysis period is available in the ELDB.
2. Create the Analysis Control File (TGY35A.CTL or TGY36A.CTL) — a list of keys with fixed strata and domain assignments for each customer within each domain (and customer billed energy, if using ratio).
3. Create the Analysis Environment File (TGY35B.ENV or TGY36B.ENV) — a set of commands that direct the analysis calculations and report generation.
4. Verify or modify other input files:
    - Time-of-Use Schedule File (TGY31D.TOU)
    - Season Schedule File (TGY31E.SEA)
    - User-Specified Day File (TGY31F.USD)
    - Holiday File (TGY31C.HOL)
5. Run the Analysis Program (Y350 for Domains MPU / Y360 for Domains Ratio).

Figure 11-1: Overview of the Domains MPU and Domains Ratio Analysis summarizes the inputs you must provide and the outputs you can expect.

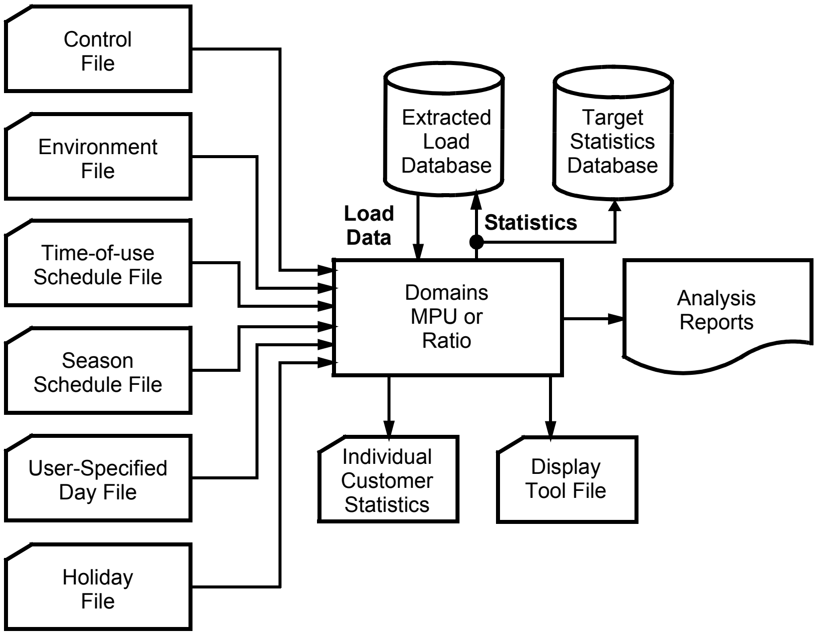


Figure 11-1 Overview of the Domains MPU and Domains Ratio Analysis

Step 1: Ensure Data is Available in the ELDB

Prior to running the analysis, be sure that the ELDB contains reliable load data for all representatives of the domain over the entire analysis period. (*Chapter 5* of the *Oracle Utilities Load Analysis Load Data Analysis User's Guide* provides detailed instructions for getting data in the ELDB.) You may wish to run the ELDB Summary Reporter (Y440) to verify that the desired data is available.

Other requirements for load data are the same as those for Standard Load Analysis (see Step 1 in *Chapter 7* of the *Oracle Utilities Load Analysis Load Data Analysis User's Guide*).

Step 2: Create the Analysis Control File (TGY35A.CTL or TGY36A.CTL)

The Analysis Control File is a list of keys identifying the customers to be analyzed, along with their strata and domain assignments. If you are using the Domains Analysis Ratio Program, you may also provide billed-energy values for each customer.

> **Note:** If you have set up your descriptor to include required information, then you can use Key Generator to perform queries and create query lists.

Strata assignments typically come from the original sample design. *Domain assignments*, on the other hand, must be determined externally. That is, because the definition of the domain(s) typically post-dates the sample design, you will have to determine whether or not each customer belongs to a domain, based on characteristic data obtained via surveys or other methods. The Customer Data Extraction (CDE) Program can be a useful tool for this process. That program, which is described later in this manual, enables you to create a file of customers that match a set of user-specified criteria (as long as the defining characteristics are captured in the Customer Attribute File). Other options for creating the Control File are to type it manually, or to use the Key Generator Program to create a file of customers based on fields in the Oracle Utilities Load Data Records (the Key Generator programs are described later in this manual).

Billed energy (for ratio only) typically comes from "Billing." If you cannot provide customer billed energy, you can have the program calculate the values from interval data in the Interval Database. (This is explained further later in the chapter.) Another alternative is to use the Billed Energy Program to calculate customer billed energy by billing cycles. This is the preferred approach, and is explained in *Chapter 14, "Computing Customer Energy Use by Billing Cycles Using the Billed Energy Program (Y230),"* in the *Oracle Utilities Load Analysis Load Data Analysis User's Guide.*

(Note about combining channels into single sample points: The Analysis Control File allows you to combine multiple channels of data for a single customer-id into a single "cut" for analysis. If you want to combine multiple customer-ids for a large individual customer to create a single sample point, you will have to use the Transformation Program or the Billed Energy Program prior to analysis.)

No matter which method you use to construct the Control File, it must consist of a series of control records that conform to the format specified below, with one record for each sample point. You may input spaces and/or a comma between elements in the command record, with the exception that blanks are not allowed before or after an operator if combining channels.

> **Note:** The energy units-of-measure of all customers in the Analysis Control File must be compatible with each other. Groups of compatible units-of-measure (i.e., different units that may be analyzed together) are listed in *Appendix I* of the *Oracle Utilities Load Analysis Load Data Analysis User's Guide.*

Control File Record Format for Domains MPU

customer-id chan1 **[{±}chan2 [{±}chan3...[{±}chan***n* **]]]** *strata-number* **[***domain***]**

Control File Record Format for Domains Ratio

customer-id chan1 **[{±}***chan2* **[{±}***chan3***...[{±}***chann* **]]]** *stratum-number* **[***domain***]** **[***customer-billed-energy***]**

- **customer-id** (*required*) — enter the Oracle Utilities Load Analysis customer-id.
- **chan1,chan2...chanX** (*required)* — enter the channel-number, or a combination of channels, for that customer-id. A combination consists of two or more channels added or subtracted to represent the total customer load (e.g., 1+2-7 is the sum of channels 1 and 2 minus channel 7, a co-generation unit). Do not add blanks before or after an operator. The data is combined strictly for the analysis; no new records are created. ***Note:*** *At least one channel-number is required per record.*
- **strata-number** (*required*) — enter the number identifying the stratum to which the customer belongs. ***Note:*** The Domains programs perform only fixed stratification, not floating. If performing non-stratified analysis, all customers should be assigned to strata 1.
- **domain-number** — enter the number identifying the domain to which the customer belongs. The value may be a numeric (1 to 9) or alpha (A to Z). If you do not specify a domain, the customer will be assigned to domain 0. Customers in domain 0 are included in calculating the total sample size, but are not included in any domain calculations.
- **billed-energy** — (*for ratio only*) — enter the actual billed energy for the customer, for the billing cycle corresponding to the analysis period. Enter the value as a positive floating point number. This number should come from "books and records", or you can use the Billed Energy Program to calculate it.

  Alternatively, if you cannot provide accurate billed energy values for each customer in the Control File, you can have Oracle Utilities Load Analysis calculate the values from the interval data as part of the Domains analysis job run. Simply leave off all billed-energy values from the Control File records, but be sure to specify BIL NO in the Analysis Environment File (explained later in this chapter). ***Note:*** This last approach is not the preferred one, since it calculates customer energy for the analysis period rather than billing cycles. See *Chapter 14, "Computing Customer Energy Use by Billing Cycles Using the Billed Energy Program (Y230),"* in the *Oracle Utilities Load Analysis Load Data Analysis User's Guide* for additional details.

An example of an Analysis Control File for Domains MPU is shown in Figure 11-2: Sample Analysis Control File for Domains MPU; for Domains Ratio in Figure 11-3: Sample Analysis Control File for Domains Ratio.

```
D1011 1,    1,    /* CHANNEL(S), STRATA, DOMAIN
D1015 1,    1,    2
D1019 1,    1,    1
D1023 1,    2,    1
D1026 1,    2,
D1031 1,    2,    1
D1048 1,    2,    2
D1050 1,    3,    1
D1054 1+2,  3,    1
D1062 1,    3,    1
D1073 1,    3,    2
D1079 1,    3,    2
D1081 1,    3,    2
D1088 1,    3,    2
```

Figure 11-2 Sample Analysis Control File for Domains MPU

In this example, there are three strata and two domains. Two customers do not meet the criteria for membership in either domain and therefore are not assigned. (They are included in the file so that the program can calculate sample size.)

```
P7301 1,    1,    0,200/* CHANNEL(S), STRATA, DOMAIN, ENERGY
R7308 2,    2,    0,400
R7311 1,    4,    2,150
R7312 1+2,  4,    2,350
R7393 1+2,  2,    0,300
R7397 1,    1,    2,175
S7378 1,    1,    0,125
T7316 1+2,  3,    2,650
W7333 2-1,  2,    2,300
W7336 2-1,  4,    2,110
W7338 1+2,  3,    0,550
X7339 1+2+3,2,    0,425
X7342 1+2+3,2,    0,325
X7480 3-2-1,3,    2,700
Z7353 1,    1,    0,50
```

Figure 11-3 Sample Analysis Control File for Domains Ratio

In this example, there are four strata and one domain.

Step 3: Create the Analysis Environment File (TGY35B.ENV or TGY36B.ENV)

The Analysis Environment File contains commands that direct the analysis calculations and report generation. The commands are summarized in Figure 11-4: Format for the Domain MPU and Domain Ratio Analysis Environment File. Examples are provided in Figure 11-5: Example Domains MPU Environment File and Figure 11-6: Example Domains Ratio Environment File. When creating the file, enter one command per line. Each line must begin with the command name (keyword); but you need enter only the first three letters of the keyword. You may enter the commands in any order. If you do not specify a command, the program will assume the default (underlined). Following is a detailed description of each command, provided in the same order as they are listed in Figure 11-4: Format for the Domain MPU and Domain Ratio Analysis Environment File.

Note to users familiar with the Standard Load and Ratio Analysis programs: Most of these commands perform the same functions as the corresponding commands in the Standard Load and Ratio Analysis Environment File. Only the following commands differ: *Alpha* (more options are available), *Assign* ("Fixed" stratification is the only option), *Domain* (a new command for defining each domain), *Energy* (a new command for specifying domain billed energy), *Key* (only 4 characters may be used), *Population* (a new command for specifying strata/domain population), *Report,* and *Write* (the NOStrata option is not available for Domains Ratio; and the secondary option "Factor" is not available for Domains MPU, because that program does not produce or report Coincident Load Factors, Diversity Factors, and Coincident Factors).

DATe *start-date stop-date*

AGGregate [*n* | 3600]

ROLling *n* ['*q*' | '8']

QUAlity ['*q*' | '8']

DROp [*d*% | 100%]

PROrate [YES | NO]

BILling [YES | NO]

ASSign [**FIXed** [*comment* | **KWH**]]

STRata [*stratum-number* | 1 [*strata-billed-energy* [*boundary* | **INFinity** [*population* | 0 [weight | 0-0]]]]]

TOTalpopulation *n*

COMbined [*population-billed-energy*]

DOMain *domain-number* [*title*]

POPulation *stratum-number domain-number domain-population-in-stratum*

CLAss

ENErgy *domain-number* [*domain billed energy* | 0] [*domain population*]

SCHedule [*t* | 0] [**NOPrint** | **PRInt**]

SEAson [*s* | 0] [,**NOPrint** | ,**PRInt**]

PEAk *peak-time*

GRA

GROup *title*

ICS [**CHAracter** | **BINary**]

REPort [**PREliminary** | **NOEvaluation** | **COMplete**]
[**AVErage**][**PEAk**][**MINimum**][**CD**][**MCD**]
[**NCD**][**ENErgy**][**FACtor**][**DAIly**][**ICS**][**ENTire**] [**PREcision**]

KEY [*key* | **STAR**]

WRIte [**NO**| **NOStrata** | **COMplete** [**AVErage**][**PEAk**]
[**MINimum**][**CD**][**MCD**][**NCD**][**ENErgy**] [**FACtor**][**ENTire**]]

ALPha [5% | n%]

MINinum [0 | **ZERo** | **NONZero**]

Figure 11-4 Format for the Domain MPU and Domain Ratio Analysis Environment File

```
AGGREGATE       1800
ALPHA           5%      /* 5% SIGNIFICANCE FOR T-STATISTIC
ASSIGN          FIXED KWH
DATE            11/01/88  11/30/88
DOMAIN          1 CENTRAL AC
DOMAIN          2 WINDOW AC
DROP            10%     /* DROP CUST IF 10% OR MORE MISSING
GROUP           RESIDENTIAL RATE CLASS AIR CONDITIONING
KEY             RSAC
PEAK            11/21/88-17:59:59
PRORATE         YES
QUALITY         ‘L’     /* ACCEPT QUALITY “L” OR BETTER
REPORT          COMPLETE AVERAGE PEAK ENERGY
ROLLING         60‘L’   /* ROLL AT 3600 SPI AGG IF ≤ QUAL “L”
SCHEDULE2       /* USE TIME-OF-USE SCHEDULE 2
STRATA          1,350.0, 10400/* STRATA, BOUNDARY, POPULATION
STRATA          2,600.0, 32790
STRATA          3, INF, 8370
```

Figure 11-5 Example Domains MPU Environment File

This example shows an Environment File for a typical stratified analysis. The original sample was designed with three strata based upon energy usage (KWH). Two air conditioning domains are being analyzed, and the distribution of the population across these domains is unknown.

```
AGGREGATE      3600
ALPHA          10%     /* 10% SIGNIFICANCE FOR T-STATISTICS
ASSIGN         FIXED KWH
BILLING        YES
DATE           07/01/86  07/31/86
DOMAIN         2 ELECTRIC WATER HEATING
DROP           25%     /* DROP CUST IF 25% OR MORE MISSING
GROUP          RESIDENTIAL RATE CLASS - WEATHER HEATING
KEY            RSWH
PEAK           07/04/86-13:59:59
PRORATE        YES
QUALITY        ‘7’     /* ACCEPT QUALITY “7" OR BETTER
REPORT         COMPLETE AVERAGE PEAK ENERGY
ROLLING        3600‘L’ /* ROLL AT 3600 SPI AGG IF ≤ QUAL “L”
SCHEDULE       1 /* USE TIME-OF-USE SCHEDULE 1
STRATA         1, 10264603 1950.0 10070  /* STRATA, BILLED NRGY,
BND,POP;
STRATA         2, 7399974 3800.0 7260
STRATA         3, 2995591 7300.0 2939
STRATA         4,      11443      INF     11
ENERGY         2
WRITE          COMPLETE
```

Figure 11-6 Example Domains Ratio Environment File

This example shows an Environment File for a typical stratified analysis. The original sample was designed with three strata based upon energy usage (KWH). One electric water heater domain is being analyzed, and the population of this domain is unknown.

DATe *start-date stop-date*

- **Date** — A required command that you use to establish the analysis period. Dates may be specified in the form “mm/dd/yy” or “mm/dd/yy-hh:mm:ss”. If the hour, minute, and second fields are omitted, 00:00:00 will be assumed for start-dates and 23:59:59 will be assumed for stop-dates.

  You can select any date range for which data exists in the Extracted Load Database, with the following constraints:

  > The duration of the analysis period must always be a multiple of 24 hours. Some examples of valid analysis periods are 05/01/98-09:00:00 through 06/01/98-08:59:59, and 05/01/98-00:00:00 through 05/31/98-23:59:59. Note that the duration of each of these date ranges is exactly 31 days.
  >
  > **NOTE:** All data found within any particular 24-hour period will be treated as if it occurs on the day in which that period starts - the “sendout day”. For example, if the specified date range is 05/01/98-09:00:00 through 05/31/98-08:59:59, all intervals occurring between 05/01/98-09:00:00 and 05/02/98-08:59:59 will be reported as if they occur on 05/01/98. The maximum number of intervals that can be included in a single analysis run is 36,000.

AGGregate [*n* | 3600]

- **Aggregate** — Input “n” to establish the number of seconds-per-interval for the analysis data; 300, 900, 1800, and 3600 are permitted values. 3600 is the default.

  > Where possible, Oracle Utilities Load Analysis will sum or divide each customer’s load data to the specified level.

ROLling *n* [‘*q*’ | ‘8’]

- **Rolling** — An optional command that enables you to report the analysis results in a rolling format. That is, each interval of the analysis period is an average of a number of preceding interval values and the current interval itself.

  The rolling command consists of two parameters — “n” to specify the level of aggregation for use in computing the rolled interval, and ‘q’ to set the level of acceptable data quality for the averaging.

  The value for “n” must be greater than, and a multiple of, the analysis data’s interval length. The default value is “3600”. The program will average the analysis data at the level set by “n”. For example, if the original analysis data has a level of aggregation of 900 seconds-per-interval and you set “n” to 3600, then each output interval will be the average of itself and the three preceding 900-second interval values.

  For ‘q’, input the status code for the minimum data quality you want included in the averaging. Any intervals that are missing or have status codes worse than ‘q’ will be excluded from the averaging. The status code **must** be input with apostrophes (’) on either side. The default is ‘8’ (only missing intervals are excluded).

  Oracle Utilities Load Analysis sets the status code of an output interval to the worst of the input status codes. However, if an input interval was missing or excluded, the output status code can be no better than ‘5’. ***Note:*** You can find a list of Oracle Utilities Load Analysis status codes in *Chapter 3* of the *Oracle Utilities Load Analysis Load Data Analysis User’s Guide*, or in the “*Quick Reference Guide*”.

QUAlity [‘*q*’ | ‘8’]

- **Quality** — Use this command to set the level of acceptable data quality for the analysis. Input the worst acceptable status code. Oracle Utilities Load Analysis will treat any interval with a status code worse than ‘q’ as missing. ***Note:*** The status code must be input with apostrophes (’) on either side. The default is ‘8’ (only missing intervals are excluded).

DROp [*d*% | 100%]

- **Drop** — This command establishes the threshold for dropping customers due to missing or excluded data. If a customer is missing d% or more of the total expected intervals in the analysis period (due to missing data or data excluded by the Quality Command), Oracle Utilities Load Analysis will drop the customer from the analysis. ***Note:*** This command is superseded by the requirement that each customer have at least one non-missing interval in each time-of-use period.

  The value for “d” must be a non-negative integer between 0 and 100, inclusive. The percent sign (%) is optional. The default is “100".

PROrate [YES | NO]

- **Prorate** — Use this command to specify whether or not total energy values for each customer should be adjusted to compensate for missing data. Application of the Prorate Command affects any calculations based on energy, including floating stratification assignments, load factors, etc. However, it does **not** fill in missing demand values.

  If you input “PRO YES”, each customer’s total energy value will be multiplied by the ratio of expected intervals to actual intervals within each time-of-use period. If you input “PRO NO”, Oracle Utilities Load Analysis will make no adjustments for missing or excluded data. NO is the default.

BILling [**YES** | **NO**]

- **Billing** — *for Ratio only* — This command enables you to specify the energy values for individual sample customers that Oracle Utilities Load Analysis will use to compute the ratio denominator of the ratio estimate. If you specify "YES," Oracle Utilities Load Analysis will use the billed-energy values you supplied in the Control File. If you specify "NO", the program will automatically calculate energy values for each customer-id from the recorded interval data in the Oracle Utilities Load Analysis database. "NO" is the default. "BIL YES" must be specified to produce the Billed Energy Summary Report.

  Reminder: if you specify "YES", you **must** supply actual customer billed energy values in the Control File.

ASSign [**FIXed** [*comment* | **KWH**]]

- **Assign** — This command indicates the method by which customers are assigned to strata. Since the Domains Program requires that the strata assignments be fixed, you must indicate FIXed. This means that the program will use the strata assignments you supplied in the Control File. If desired, use the comment field to note the criteria that were the basis for the strata assignments. Input up to 12 characters, with no intervening blanks. The default is KWH (this is simply a comment; it does not affect processing).

STRata [*stratum-number* | 1 [*strata-billed-energy* [*boundary* | **INFinity** [*population* | 0 [weight | 0-0]]]]]

- **Strata** — Provides information about each stratum in the analysis. How you set up the Strata Command(s) largely determines what kind of analysis the program performs. Generally, you will supply one Strata Command for each stratum in a stratified analysis. If you supply just one Strata Command in the file, the program will perform a non-stratified analysis. If you leave out the command altogether, the program will perform the default: non-stratified analysis of a 100% sampled population.

  Parameters you supply within the command further influence the type of analysis, as explained below.

  Input one command (line) for each stratum in the analysis. **Up to 99 strata may be defined.** The following explains each parameter in the command:

  stratum-number — Identifies the stratum. It must be a positive integer from 1 to 99. Within the file, stratum numbers must appear in consecutive order starting with "1". For a non-stratified analysis, use a single Strata Command specifying stratum number 1.

  stratum-billed-energy (*For Ratio only*) — Input the actual total billed energy for the stratum population as a positive floating point number. ***Note:*** Stratum-billed-energy is required even if you set the Billing Option to NO (see the Billing Command, earlier in this section).

  boundary — Defines the upper boundary of the stratum.

  For a non-stratified analysis — Specify the stratum boundary as "INF".

  For a pre-stratified analysis — You may use this position in the command for comments. Your comments can consist of up to 12 characters with no intervening blanks.

  For a stratified analysis — Specify "INFinity" as the boundary for the last stratum.

population — the size of the stratum population, or the entire population if performing a non-stratified analysis. If you input "0" or omit the parameter, Oracle Utilities Load Analysis will assume that the population equals the stratum sample size (100% sampling).

weight — optional weighting factor for the stratum. Your input must be a floating point number between zero and one. If you input zero (0.0) or do not supply a weight, Oracle Utilities Load Analysis will assign a weight based on the stratum population.

> **Note:** The strata boundaries, population, and weight typically come from the original sample design criteria.

TOTalpopulation *n*

- **Totalpopulation:** When this command is supplied, if any integers have been assigned in the strata population command, the TOTalpopulation calculations will override the user-supplied values. The value of n must be a non-negative integer.

  When this happens, that line of the environment file report will be flagged with an asterisk and a legend will appear at the bottom of the report that will read:

  "*The supplied strata population has been overridden by the TOTalpopulation command."

  When the TOT command is in effect, the title of the POPULATION column in the environment report is changed to "CALCULATED POPULATION".

  When using the TOT command, the user must include a place holder of zero (0) for the strata populations to avoid the override messages in the environment report.

  If both the strata populations and the strata weights are omitted from the strata commands, and the TOT command is present and valid, the system will equally allocate the total population supplied across the stratus and indicate this in the environment report.

  When the user supplies a TOT value in the Environment file, and the strata populations but omits the weights, the program assigns weights as documented and then adjusts the strata populations according to the assigned weights.

  The strata populations are calculated using the following formula. The Class Population is supplied via the new TOT n environment file command.

  Strata Population = Class Population * Strata weight.

COMbined [*population-billed-energy*]

- **Combined** (*optional, for ratio only*) — Use this command to supply the actual total billed energy for the entire population, instead of using the Strata Command's stratum-billed-energy field to allocate the population billed energy across individual strata. Input the value as a positive floating point number. When you supply this command, stratum-billed-energy on Strata commands is ignored.

DOMain *domain-number* [*title*]

- **Domain** — Use this command to define a domain for analysis. Within a single Environment File, you can supply from 1 to 34 Domain commands. Each domain you define in the file will be analyzed in the program run. *The population of all domains defined in the file must be mutually exclusive.*

  One Domain Command is required for each domain included in the analysis period. Multiple Domain commands must be specified in ascending order, with numeric domain-numbers preceding alphabetic; gaps in the sequence are permitted. The command consists of the keyword DOMain and the following parameters:

domain-number (*required*) — Must be either an integer from 1 to 9 or a single letter of the alphabet (A to Y); domain Z is reserved for optional class totals. This provides for a maximum of 34 domains. ***Note:*** The domain-numbers in the Environment File must correspond to the domain-numbers you used in the Control File.

title (*optional*) — a string of not more than 74 characters that will appear in the heading of each report.

CLAss

- **Class** (*optional*) — Use this command to request an additional set of reports and/or statistics for the entire class of customers (sample) being analyzed, including customers in all domains and those in no domain (domain 0). Results will be comparable to those obtained from a non-domains Standard Analysis (Y310) or Ratio Analysis (Y330) run with the same sample and similar Environment File commands.

POPulation *stratum-number domain-number domain-population-in-stratum*

- **Population** (*optional*) — Use this command to define the population of a domain within a stratum for the time period of the analysis.

  If performing Domains MPU: If you supply domain population, the program will use this value to expand the mean and class totals. This is the preferred method, and should provide the most accurate estimates. If you do not supply domain population, or if you specify a zero population, the program will use the strata populations for class expansion. (See the equations in *Appendix G* of the *Oracle Utilities Load Analysis Load Data Analysis User's Guide* for further information.)

  If performing Domains Ratio: If you supply domain population, the program will report the value in the Environment File Report, and will use the domain population to calculate the mean (average) demand. If you do not supply any values, the program will print the message "Domain Populations Unknown" in the report.

  For either type of analysis, you can enter the Population commands in any sequence, but you can have no more than one Population Command for each stratum/domain combination in the analysis. Each command consists of the keyword POPulation and the following parameters:

  stratum-number — the identifier for a stratum that you originally defined using a Strata Command.

  domain-number — the identifier for a domain that you originally defined using a Domain Command.

  domain-population-in-stratum — a non-negative integer specifying the population of the indicated domain in the indicated stratum. This information is usually obtained from customer survey information.

ENErgy *domain-number* [*domain billed energy* | 0] [*domain population*]

- **Energy** (*optional, for ratio only)* — Use to specify the actual (estimated or computed) billed energy for a particular domain. If no domain billed energy information is available, you can omit this command and the billed energy will default to zero. The command consists of the keyword ENErgy and the following parameters:

  domain-number — the identifier for a domain that you originally defined using a Domain Command.

  domain-billed-energy — known or estimated total billed energy for the domain, specified as a positive floating point number.

domain-population (*optional*) — the population of the entire domain, across all strata. This is a quick alternative to supplying domain populations by strata using the Population Command, above. This alternative supersedes the Population Command; any Population commands left in the Environment File will be ignored, and an informational message printed. If you wish to enter domain population this way, without entering billed energy, code 0 as the domain-billed-energy parameter.

SCHedule [*t* | 0] [**NOPrint** | **PRInt**]

- **Schedule** — Use to select a single schedule from the Time-of-Use Schedule File (TGY31D) for the time-of-use calculations. The parameter “t” is a non-negative integer representing a particular schedule in your TOU file. The default, “SCHedule 0”, automatically defines a single time-of-use period equal to the analysis period.

  Use the PRINT option if you want to print graphs of the time-of-use periods as part of the Analysis Environment Report; use the NOPrint option if you do not want a hard copy of the graphs. The default is PRInt, except for SCHedule 0, for which the default is NOPrint.

  Note about the Time-of-Use Schedule File: Instructions for modifying or adding new schedules to the Time-of-Use File are provided in Step 4 of *Chapter 7, “Expanding Load Data to Class-Level Estimates Using the Load Analysis Programs (Y310 and Y330)”,* in the *Oracle Utilities Load Analysis Load Data Analysis User’s Guide. It is very important to keep in mind that any schedule you select must cover the entire analysis period you specified with the DATe Command. If the program encounters a gap, it will stop processing and issue a warning message.*

SEAson [*s* | 0] [,**NOPrint** | ,**PRInt**]

- **Season** — Use this command to select a schedule from the Season Schedule File (TGY31E) for the time-of-use calculations. Specifying a Season Schedule makes it possible to apply different Time-of-Use schedules to different portions of the analysis period.

  The parameter “s” is a non-negative integer representing a particular Season Schedule within the Season Schedule File. The default, “SEASON 0”, indicates that a single Time-of-Use Schedule, as specified in the SCHEDULE Command, is to be applied over the entire analysis period.

  The PRINT option indicates that graphs of time-of-use periods are to be printed with the Analysis Environment Report; the NOPRINT option suppresses the printing of these graphs. The default is PRINT.

  Note: Either the Season Command or the Schedule Command may be used to define time-of-use periods for analysis processing, but not both. If you include both commands in the Environment File, the program will use the Season Command and disregard the Schedule Command. If you include neither command, the default is “SCHEDULE 0, NOPRINT”.

  About the Season Schedule File: Instructions for modifying or adding new schedules to the Season Schedule File are provided in Step 5 of *Chapter 7* in the *Oracle Utilities Load Analysis Load Data Analysis User’s Guide.* It is very important to keep in mind that any schedule you select must cover the entire analysis period you specified with the Date Command. If the program encounters a gap, it will abort processing and issue an error message.

PEAk *peak-time*

- **Peak** — This command enables you to specify the date and time of peaks of interest that are not automatically computed by Oracle Utilities Load Analysis – such as system peak. Oracle Utilities Load Analysis will compute statistics for the entire day in which each supplied peak falls.

You must use the format “mm/dd/yy-hh:mm:ss” to specify the peak. You can input up to 25 peaks for an MPU Analysis, or up to 23 for a Ratio. Input one peak per line. The default is no peaks.

GRA

- **GRA** - This command determines that a graphics file is produced when running this program.

GROup *title*

- **Group** — Use the Group command to assign a title to appear at the top of each analysis report produced at the end of the program run. You can input one or two Group commands (one per line), for one or two titles at the top of the reports, for the Y360 program; for the Y350 program, you can input one Group command. Each title is limited to 78 characters. Note that using the Group command overwrites the default report name in its first header and the Indexer. If you omit the command, the program supplies specific titles for output reports.

ICS [**CHAracter** | **BINary**]

- **ICS** — This command establishes the format for numbers written in the Individual Customer Statistics File (a file containing basic load statistics for each customer in the analysis).

  Select “CHARACTER” to write numbers in “picture” format, that is, numbers and characters that can be easily interpreted by the user. This option should be used if you want to examine the contents of the file.

  Select “BINARY” to write numbers in binary format, that is, a compressed format that cannot be read easily by the user. Numbers that are written in binary format can be readily interpreted by computer programs, and require less storage space. Binary format numbers are equivalent to PL/1 Float Binary or COBOL Comp1 Formats.

  The default for the command is “ICS BINARY”.

  The record formats for both types of files are shown in *Appendix E* of the *Oracle Utilities Load Analysis Load Data Analysis User’s Guide.*

REPort [PREliminary | NOEvaluation | COMplete][AVErage][PEAk] [MINimum][CD][MCD] [NCD][ENErgy][FACtor][DAIly][ICS][ENTire] [PREcision]

- **Report** — Use the primary options of this command to specify which groups of statistics Oracle Utilities Load Analysis should calculate and report, and use the secondary options if you wish to print only selected reports. See the tables later in this chapter for a summary of your options.

  PREliminary — when you select this option, Oracle Utilities Load Analysis will produce only the Analysis Environment and Individual Customer Statistics reports. This option enables you to preview the analysis results on a customer basis before incurring the overhead associated with a complete analysis.

  NOStrata (*available for MPU only*) — this option produces all report types, but does not report the information on individual strata usually included in the Sample Evaluation Reports. This option is useful when class totals are needed for each interval of the analysis period, but none of the strata detail. This option does not affect the reporting of the major statistics, which still include results broken down by strata.

  NOEvaluation — this option suppresses the printing of all components of the Sample Evaluation reports. Since these reports tend to be very lengthy, this option can substantially reduce the size of the hard copy output. Use this option when you want only the major statistics and analysis environment reports.

COMplete — select this option to calculate all statistics and print *all* reports. This option also produces complete load duration statistics. REPORT COMPLETE is the default.

Use the secondary options if you wish to print only selected reports. The program will still calculate all statistics based on your input for the primary options, but only the specified report(s) will be printed based on the secondary options. For example, if you want to calculate all statistics but print only the Energy Report and Individual Customer Statistics Report, use this command: “REP COM ENE ICS”.

AVErage — prints all average day type evaluation reports: TGY310-08 through TGY350-20, or TGY360-08 through TGY360-23.

PEAk — prints all peak day and supplied peak evaluation reports: TGY350-24-XX or TGY360-24.

MINimum — prints all minimum day reports: TGY350-2X or TGY360-2X.

CD — prints the Maximum Coincident Demand Report: TGY351-10 or TGY361-10.

MCD — prints the Minimum Coincident Demand Report: TGY361-15 or TGY351-15.

NCD — prints the Noncoincident Demand Report: TGY351-20 or TGY361-20.

ENErgy — prints the Energy Report: TGY351-30 or TGY361-30.

FACtor (*for Ratio Analysis only*) — prints the Load Factor, Diversity Factor, and Coincidence Factor reports: TGY361-50, 60, and 70.

DAIly — prints Daily Maximum, Minimum, and Average Demand Report: TGY350-31 or TGY360-31.

PREcision — prints Daily Maximum, Minimum, and Average Accuracy Report: TGY350-32 or TGY360-32.

ICS — prints the Individual Customer Statistics Report: TGY351-90 or TGY361-90.

ENTire — prints the Entire Period Sample Evaluation Report: TGY350-03 or TGY360-03.

KEY [*key* | **STAR**]

- **Key** — Use the Key Command to assign an identifier to each of the statistics produced by the analysis run. This identifier becomes the prefix in the statistics name (see the “Statistics Identifiers” section in *Chapter 3* of the *Oracle Utilities Load Analysis Load Data Analysis User’s Guide*).

  Note: You can use up to 40 characters, *the first of which must be alphabetic.* A combination of characters (A - Z) and digits (0 - 9) may be used, but special characters (anything that is not a letter or number) are *not* allowed. The default key is “STAR”.

  The program will automatically append the domain-number for which the statistics were computed using the format “Dn” (i.e., STARD1 would be the key for statistics computed for domain 1).

WRIte [**NO**| **NOStrata** | **COMplete** [**AVErage**][**PEAk**] [**MINimum**][**CD**][**MCD**][**NCD**][**ENErgy**] [**FACtor**][**ENTire**]]

- **Write** — Use this command to determine which statistics, if any, should be written back to the ELDB.

NO — No statistical records are written back to the ELDB, even if you specify any of the secondary WRITE options. Use this option when you need just the hard copy output reports.

NOStrata (*available for MPU only*) — Individual strata information for the major statistic reports are written to the ELDB, but individual strata statistics in the Sample Evaluation reports and individual strata level duration statistics are not.

COMplete — Writes all statistical records produced by the analysis run back to the ELDB. This is the default.

Use the secondary options in conjunction with the NOSTRATA or COMPLETE options to write only selected statistics. The program will still calculate all the statistics based on your input for the primary options, but only the specified statistics will be written to the ELDB.

AVErage — writes all average day type statistics, such as average weekday.

PEAk — writes all statistics for peak day and user-supplied peak days.

MINimum — writes all minimum day statistics.

CD — writes Maximum Coincident Demand statistics.

MCD — writes Minimum Coincident Demand statistics.

NCD — writes Maximum Noncoincident Demand statistics.

ENErgy — writes Energy statistics.

FACtor — writes statistics corresponding to Load, Diversity, and Coincidence Factors.

ENTire — writes Entire Period statistics.

ALPha [5% | <u>n</u>%]

- **Alpha** — This command enables you to set the significance level for t-statistics used in the computation of relative precision. The percentage “n” may be 5, 10, 20, 30, 40, 50, or 60. The percent sign (%) is optional.

MINinum [0 | **ZERo** | **<u>NONZero</u>**]

- **MINimum** — This command enables you to determine if the Daily Maximum, Minimum, and Average Demands Report will process zero-values as minimums or ignore them as missing. If “0” or “ZERO” is specified, zero-values will be shown as minimums. This might be appropriate, for example, if the analysis is on streetlighting data. “NONZERO” is the default.

Step 4: Verify or Modify Other Required Input Files

Along with the Control and Environment Files, four other input files may be required for a Domains Analysis (depending upon your selections in the Environment File):

- Holiday File (TGY31C.HOL) — a list of holidays observed in your service territory.
- Time-of-Use Schedule File (TGY31D.TOU) — a series of TOU schedules.
- Season Schedule File (TGY31E.SEA) — a series of season schedules, which enable you to apply different TOU schedules at different times of the year.
- User-Specified Day File (TGY31F.USD) — specifies a group of contiguous or non-contiguous days that may be averaged together for analysis (for example, a set of summer peak days).

Typically, these files are established at system installation and seldom modified. Should you need to update or modify these files (if you want to experiment with a new Time-of-Use Schedule, for example) see steps 4 - 7 of *Chapter 7* in the *Oracle Utilities Load Analysis Load Data Analysis User's Guide*. Alternatively, you may select local versions of these files, located in your Data directory. Selecting "Default" instructs the program to use the default versions set up by your Oracle Utilities Load Analysis administrator.

Step 5: Run the Analysis Program

Run Y350 for Domains MPU and Y360 for Domains Ratio. Once you have created and verified the necessary input files, you are ready to run the analysis program.

Domains Analysis Mean Per Unit Processing

Processing in the Domains MPU Program follows these steps:

- The Environment File is processed. If an error is detected, the program terminates with a diagnostic message.
- The Holiday File is processed. If an error is detected, the program terminates with a diagnostic message.
- The Time-of-Use File is processed. If an error is detected, the program terminates with a diagnostic message.
- The Control File is processed. For each customer, the customer-id, channel(s), fixed stratum, and domain number are read. *The stratum number must match one of the stratum specified in the Environment File.* If no domain number is specified, the customer is assigned to domain zero. If an error is detected, the customer is dropped and processing continues with the next customer.
- For each DOMAIN Command in the Environment File (and for the entire sample, if the Class Command is used) the following steps are performed:

  The indicated channel(s) for a customer is retrieved from the ELDB for the analysis period and aggregated accordingly. If an aggregated interval is incomplete, it is assigned a status code of '7'. Each channel is converted to energy units and, if necessary, combined. *Combined intervals are assigned the worst of the component status codes*; incomplete combined intervals are assigned a status code of '7'. If one or more channels is missing in its entirety, the customer is dropped and processing continues with the next customer.

  The customer's combined energy array is scanned for quality. If an interval's status code exceeds the quality code specified in the Environment File, the interval is set to zero and flagged as missing.

  The customer's energy array is scanned for missing data over the entire analysis period. If the number of missing intervals exceeds the drop threshold specified in the Environment File, the customer is dropped and processing continues with the next customer.

  The customer's energy array is scanned for missing data on a time-of-use period basis. If all data within any time-of-use period is missing, the customer is dropped and processing continues with the next customer.

- The following statistics are calculated within each time-of-use period:

  Actual energy

  Prorated energy (if selected), based on the ratio of expected intervals to non-missing intervals

  Non-coincident demand, date and time.

- The following statistics are calculated for the entire period:

  Actual energy, defined as the sum of time-of-use period actual energies

  - Prorated energy (if selected), defined as the sum of time-of-use period prorated energies
  - Non-coincident demand, date and time.
- The following statistics are calculated for each supplied peak:
  - Coincident demand
  - Diversity factor.
- If preliminary analysis is selected, processing continues with the next customer.
- The customer's energy array is converted to demand units, and is accumulated into the sum of demands, sum of squared demands, sample size, and domain size, for the indicated stratum for each interval in the period.
- If preliminary analysis is selected, the program skips to the output section for individual customer statistics.
- The stratum arrays are checked for completeness. If one or more strata is empty, the program issues a diagnostic message and skips to the output section. *If a stratum sample size exceeds the population specified in the Environment File, the program assumes 100% sampling* for the stratum and issues a diagnostic message.
- The strata statistics for coincident demands are computed according to the methodology listed in *Appendix F* of the *Oracle Utilities Load Analysis Load Data Analysis User's Guide*. Total demand is computed based on the domain population, if the population is known. If the domain population is unknown, then total demand is estimated based upon the total sample population. A sample evaluation report is printed for the entire period, and the coincident demand statistics are written to the ELDB.
- The maximum and minimum demands, with dates and times, are computed over the entire period, by time-of-use, for supplied peaks (no minimum), and for strata peaks.
- Coincident demands are computed, reported, and written to the ELDB for the following types of days:
  - Average day
  - Average day, excluding holidays
  - Average weekday
  - Average weekday, excluding holidays
  - Average weekend
  - Average weekend including weekday holidays
  - Average weekend, excluding holidays
  - Average Sunday, Monday, ..., Saturday
  - Weekday holiday (if available)
  - Weekend holiday (if available)
  - Days of maximum demands (entire period, and by time-of-use)
  - Days of minimum demands (entire period, and by time-of-use)
  - Days of supplied peaks (if available)
  - Daily maximum and minimum demands.
- Individual customer coincident demands are retrieved for the strata peak, and for class peak over the entire period and by time-of-use. Customer diversity factors are also computed.

The following class and strata statistics are computed from the individual customer statistics according to the methodology in *Appendix F* in the *Oracle Utilities Load Analysis Load Data Analysis User's Guide*:

Non-coincident demand

Energy.

The above statistics are reported and written to the ELDB. For both preliminary and complete analysis, the individual customer statistics are reported and written to a sequential file.

Domains Analysis Ratio Processing

Processing in the Domains Analysis Ratio Program consists of the following steps:

- *The Environment File is processed* — If an error is detected, the program terminates with a diagnostic.
- *The Holiday File is processed* — If an error is detected, the program terminates with a diagnostic.
- *The Time-of-Use File is processed* — If an error is detected, the program terminates with a diagnostic.
- The Control File is processed. For each customer, the customer-id, channel(s), fixed stratum, domain, and optional customer billed energy value are read. *The stratum number must match one of the stratum specified in the Environment File.* If the billing option was set to "YES", the energy values in the Control File are used in the domain ratio estimates. If an error is detected, the customer is dropped and processing continues with the next customer.
- For each DOMAIN Command in the Environment File (and for the entire sample, if the Class Command is used), the following steps are performed for all customers belonging to a particular domain:

  The indicated channel(s) is retrieved from the ELDB for the analysis period and aggregated accordingly. If an aggregated interval is incomplete, it is assigned a status code of '7'. Each channel is converted to energy units and, if necessary, combined. *Combined intervals are assigned the worst of the component status codes*; incomplete combined intervals are assigned a status code of '7'. If one or more channels is missing in its entirety, the customer is dropped and processing continues with the next customer.

  If the ROLLING option is selected the combined channel is converted to rolling average intervals at the specified "window" size. If intervals within a window are below the desired level, they are considered missing and the resulting average is given a status code of '5'.

  The customer's combined energy array is scanned for quality. If an interval's status code exceeds the quality code specified in the Environment File, the interval is set to zero and flagged as missing.

  The customer's energy array is scanned for missing data over the entire analysis period. If the number of missing intervals exceeds the drop threshold specified in the Environment File, the customer is dropped and processing continues with the next customer.

  The customer's energy array is scanned for missing data on a time-of-use period basis. If all data within any time-of-use period is missing, the customer is dropped and processing continues with the next customer.
- The following statistics are calculated within each time-of-use period:

  Actual energy

  Prorated energy (if selected), based on the ratio of expected intervals to non-missing intervals

  Non-coincident demand, date and time

  Load factor based on non-coincident demand and average (prorated) demand.

- The following statistics are calculated for the entire period:

  Actual energy, defined as the sum of time-of-use period actual energies

  Prorated energy (if selected), defined as the sum of time-of-use period prorated energies

  Non-coincident demand, date and time

  Load factor based on non-coincident demand and average (prorated) energy.

- If preliminary analysis is selected, processing continues with the next customer.
- The customer's energy array is converted to demand units, and is accumulated into the sum of demands, sum of squared demands, sample size, and domain size for the indicated stratum for each interval in the period.
- If preliminary analysis is selected, the program skips to the output section for individual customer statistics.
- The stratum arrays are checked for completeness. If one or more strata is empty, the program issues a diagnostic and skips to the output section. *If a stratum sample size exceeds the population specified in the Environment File, the program assumes 100% sampling for the stratum and issues a diagnostic.*
- Depending on the billing option selected and the customer's interval status code, either the customer's recorded energy or billed energy is accumulated into a sum of energies and sum of squared energies for the indicated strata for each interval of the period. If the total domain billed energy was not supplied in the Environment File, recorded or billed energy for each customer in the sample is also accumulated into a sum of energies and sum of squared energies, for the indicated strata for each interval of the period.
- For the combined ratio estimate, the ratio is computed by dividing total domain demand summed over all strata by total domain energy summed over all strata. Total class demand is computed by multiplying this ratio by total billed energy for the domain, if domain billed energy is specified in the environment file. If no domain billed energy is supplied, then the ratio is computed by dividing total domain demand summed over all strata by total class energy summed over all strata.
- Total class demand is computed by multiplying this ratio by total billed energy for the class.
- For the non-stratified ratio estimate, the calculation is basically the same as for the combined estimate, except only one strata is involved.
- For each of the above estimates a different set of tests is performed to determine if the analysis assumptions are correct. The tests are conducted on an interval by interval basis for all intervals of the analysis period. If any of these tests are not passed, then for that interval, the ratio estimate and associated statistics computed may not yield accurate results.
- The strata statistics for coincident demands are computed according to the methodology listed in *Appendix G* in the *Oracle Utilities Load Analysis Load Data Analysis User's Guide.* A sample evaluation report is printed for the entire period, and the coincident demand statistics are written to the ELDB.
- The maximum and minimum demands, with dates and times, are computed over the entire period, by time-of-use, and for supplied peaks.
- Coincident demands are computed, reported, and written to the ELDB for the following types of days:

  Average day

  Average day, excluding holidays

Average weekday

Average weekday, excluding holidays

Average weekend

Average weekend including weekday holidays

Average weekend, excluding holidays

Average Sunday, Monday, ..., Saturday

Weekday holiday (if available)

Weekend holiday (if available)

Days of maximum demands (entire period, and by time-of-use)

Days of minimum demands (entire period, and by time-of-use)

Days of supplied peaks (if available).

- Individual customer coincident demands are retrieved for class peak over the entire period, and by time-of-use. Customer load factors and diversity factors are also computed.
- The following class, sample, and domain statistics are computed from the individual customer statistics according to the methodology in *Appendix G* of the *Oracle Utilities Load Analysis Load Data Analysis User's Guide*:

Non-coincident demand

Energy

Load factor based on maximum coincident demand

Load factor based on non-coincident demand

Diversity factor

Coincidence factor.

The above statistics are reported and written to the ELDB. For both preliminary and complete analysis, the individual customer statistics are reported and written to a sequential file.

Bias Tests

There are two types of checks on the accuracy of the analysis estimates. First, *due to a small sample size, the large sample formula for the estimated variance of the ratio estimates may be an underestimate.* This will make the estimates appear more accurate than they really are. Second, because of the tendency for the ratio estimates to be biased, a test is performed to ensure that the bias is negligible. In practice, the *bias isn't important in large or moderate size samples. However, for small samples and in stratified sampling with many strata, the bias can be significant.* A large bias can cause a ratio estimate of the mean load to be substantially different from the true population.

In a *non-stratified ratio analysis*, three separate tests are performed to ensure accurate estimation results. These consist of a *sample size test* and *two tests for bias.* The sample size test checks to see if the sample size for every interval of the analysis period is *thirty customers or more.* If the sample size is below thirty an "N" is printed in the Bias Flag field warning that the sample size may be too small for the large sample variance formula to be applicable. Two bias tests are also performed, one based on *energy* and one based on *demand.* The *energy test compares the coefficient of variation of energy* (the ratio of the standard error of the sample mean energy divided by the sample mean energy) *to the value 0.2*, a cutoff level for bias based on empirical research. If the *coefficient of variation for energy is greater than or equal to 0.2, the estimates may suffer due to biased results,* and an "E" is printed in the Bias Flag field. A *similar test is applied to demand using its coefficient of variation,* with a "D" being printed if this test fails. These three tests are performed in the order stated above. Whenever a test fails, none of the succeeding tests are performed, and the flag printed only represents the failed test.

In a *combined ratio analysis* only two tests are done. They are the *sample size test* and the *energy bias test*. For the sample size test, the *total sample size for the combined strata is tested against the cutoff value of thirty*. The energy bias test is the same as the one used in the non-stratified analysis, and the same considerations and interpretations are applicable.

The appearance of a Bias Flag for a number of intervals in any ratio analysis does not mean the results are invalid. It should be interpreted as a potential problem that can lower the accuracy and precision of the resultant calculations, but it does not invalidate the analysis. Analysts should carefully consider the results obtained and try to correct the deficiencies in their data, if possible. For more information on all of these tests and their impact on the domains ratio estimates produced, see *Chapter 6* of Cochran's book, *Sampling Techniques*, 3rd edition, John Wiley and Sons publishers, 1977.

Step 6: Check Output

At the end of a run, both programs produce three outputs: analysis reports, statistics written to the ELDB, and the Individual Customer Statistics File.

- **Analysis Reports** — Summary charts listing the reports available from the programs are shown in Table 1 and Table 2 of *Chapter 3: The Oracle Utilities Load Analysis Data Formats*. In addition, samples of the reports are reproduced at the end of that chapter.
- **ELDB Statistics** — Unless you specified the "WRITE NO" option in the Analysis Environment File, the program will write all statistics back to the ELDB or target database, saving them for further reporting and analysis. The statistics are stored as simulated cuts with statistics identifiers (see *Chapter 3*, "*Statistics Records"*, of the *Oracle Utilities Load Analysis Load Data Analysis User's Guide* for an explanation of these IDs). At the end of a run, the program produces a list of all statistics written to the database in a report entitled "Analysis Statistics Written to the ELDB". Both the format of this report, and the IDs of all possible types of statistics produced by the program, are summarized in *Appendix D* of the *Oracle Utilities Load Analysis Load Data Analysis User's Guide.*
- **Individual Customer Statistics File** — This file is optionally produced at the end of each successful analysis run. It is a sequential file containing the basic load statistics for each customer in the analysis, and can be used for further analyses with external programs. Numbers are written in "character" or "binary" format, depending on how you entered the "ICS" Command in the Environment File. You have two options for handling this file:
    - Write it over an existing file at the end of each analysis run
    - Save it, preserving the file for further use.

    Appendix E in the *Oracle Utilities Load Analysis Load Data Analysis User's Guide* details the contents and format of the Individual Customer Statistics File.

Chapter 12

Reporting Statistics and Load Data (Y410 - Y460)

Previously we have seen how the analysis programs generate extensive series of reports on the statistics they produce. Now we will look at the other options you have for reporting load data and statistics. Oracle Utilities Load Analysis includes programs that enable you to look more closely at individual statistics or load data records, to create custom reports on groups of statistics you select, and to get a listing of the entire contents of the databases. You can even produce easy-to-understand graphs of your statistics and load data.

Reporting programs described are:

- **Time Series Reporter (Y410)**
- **Load Data Reporter (Y420, Y430)**
- **The Summary Reporter (Y440, Y460)**

In addition to the reporting capabilities built into the analysis programs, Oracle Utilities Load Analysis offers three separate programs for reporting statistics and customer load data:

- **Time Series Reporter (ELDB only)** — reports user-specified groups of statistics or load data records in a tabular (columns and rows) format. Data for each selected record is reported in a single column; each row represents a different hour or time period. This program is especially useful for comparing different statistics across time—even those produced by different analysis programs. An optional file can be produced for input to user-written programs.
- **Load Data Reporter (ELDB or SLDB)** — generates comprehensive reports on individual statistics or customer load data records. It can be used to look at the details of records—for example, to view information not printed in the standard analysis reports (such as population or weight in statistics records). It is also very useful for diagnosing problems with load data records, because it shows both descriptive data and each interval value.
- **Summary Reporter (ELDB or SLDB)** — lists all or a specified portion of the contents of the ELDB and SLDB, respectively. It can list each record in the database along with its start-time and percentage of acceptable data. It is especially useful if you need to diagnose a database problem.

Each of these programs is explained on the following pages.

Time Series Reporter (Y410)

The Time Series Reporter is used primarily to report statistical records in the ELDB generated by the Load Analysis programs. The program can also be used to report individual load data cuts. It is especially useful for comparing a group of statistics across each hour in a day or at different time periods. You specify a group of statistics to be reported, and Oracle Utilities Load Analysis organizes them in a tabular format (columns and rows). You can also specify your own report titles and column headings.

In contrast to the reporting modules of the Load Analysis programs, which can show statistics from only one analysis program at a time and in a pre-defined format, the Time Series Reporter enables you to select and organize statistics according to your needs. For example, you can include statistics produced by different analysis programs in a single report. You can even compare statistics from different time periods—for example, you could compare the average weekday for each of the three summer months.

You can produce four different types of Time Series reports, corresponding to the four different types of ELDB records and statistics. The types are:

- **Customer Load Data —** each column in the report will show a selected customer load data record; each row will represent an interval in the specified analysis period.
- **Entire Period Demands —** each column will show a selected entire period statistic, each row an interval in the analysis period.
- **Average Day Demands —** each column will show a selected average day-type statistic, each row an hour in the 24-hour period.
- **Time-Of-Use Statistics —** each column will show a selected time-of-use-type statistic, each row a different TOU period or peak.

> **Important Note:** You can report only one type of record in a single report. If you attempt to mix types within a report, the program will abort or produce erroneous results.

Steps for Using the Time Series Reporter

Here is a brief list of the steps you will follow when using the Time Series Reporter to generate reports on statistical and/or customer load data records in the ELDB.

Summary — Using the Time Series Reporter (Y410)

1. Create the Time Series Reporter Environment File (TGY41B.ENV).
2. Create the Time Series Reporter Control File (TGY41A.CTL).
3. Run the Time Series Reporter Program (Y410).

Note: The Y410 program supports pre-process key generator. See **Using the Preprocess Key Generator in a Control File** on page 4-4 for more information.

Step 1: Create the Time Series Reporter Environment File (TGY41B.ENV)

Use this file to determine the date range and aggregation level of the data to be reported. The file format is:

DATe *start-date stop-date*

AGGregate [*n* | 0]

FILe [**NO** | **YES**] [**BLOCK** | **NOBlock**] [**HEAder**]

- **Date** — a required command that you use to specify the start- and stop-dates of the analysis period or load data records to be reported. You must specify the dates in the "mm/dd/yy" format. Even when the program receives a non-full-day date range, Oracle Utilities Load Analysis will assume that the time for the start-date is 00:00:00, and the time for the stop-date is 23:59:59. This enables you to specify a 24-hour period by inputting just the date (e.g., **"DATE 07/01/98 07/01/98"** indicates one 24-hour period).

  Important Note: If you are comparing statistics for different analysis periods, you use the Date Command to specify the ***length*** of time (e.g., number of intervals) to be reported. You then use the Start parameter in the Control File Key commands to identify the different analysis periods for reporting. For example, let's say you wanted a report of the average weekday from each of the three summer months. For the Date Command, you would specify a 24-hour period ("DATE 07/01/98 07/01/98"). Then, in the Control File Key commands, you would specify the start of each of the three monthly analysis periods.

- **Aggregate** — *for customer load data records only* — use this command to specify the number of seconds-per-interval for the reported data. The default is 0, which means that the program will not aggregate the data (it will be reported at its current number of seconds-per-interval).

  Depending upon the Unit of Measure for the load data, the program will either sum or average the intervals. The aggregation method used by Oracle Utilities Load Analysis for each UOM is noted in Appendix J: Oracle Utilities Unit of Measure Codes.

  Important Note: It is not recommended that you use Aggregate Command with statistics records. It could produce incorrect or misleading results. Never attempt to use it with time-of-use statistics such as Energy and Load Factor.

- **File** — use this command to save the time-series data in a file. If "FILE YES" is used, a file is written consisting of the data portion of the time-series reports, but without any page or column headers or footers. This file can be used as input to user-written programs, or used for further analysis.

If you request a file, you can ask for the blocks of data to be separated by a separator record consisting of the word “BLOCK” and a block number. The default is “FILE NO”, which means that the file will not be written. If “FILE YES” is used and the BLOCK/NOBLOCK parameter is left out, the default is
“NOBLOCK”, which means that no block separator records are included in the file. You can request to output column headers by specifying the “HEADER” parameter after “FILE YES”. This command can be used in conjunction with the BLOCK/NOBLOCK parameter.

```
DATE   07/01/98       07/31/98

AGG   0

FILE    YES   NOBLOCK   HEADER
```

Figure 11-9 Sample Time Series Reporter Environment File

Step 2: Create the Time Series Reporter Control File (TGY41A.CTL)

Use this file to establish the keys of the records to be reported, and the report headings.

You will construct the file using blocks of commands — one block defines a single report. You can enter any number of blocks in a Control File.

Each block is made up of one or more “Heading commands,” followed by *one to eight* “Key commands.” You use the Heading commands to define the words to be used in the heading of a report; you use the Key commands to specify the records you want to be reported. ***Note:*** You must use at least one Heading Command, so that Oracle Utilities Load Analysis recognizes the beginning of the block.

The format of the Control File is shown in the following illustration.

REPort *report-name*

TL*n* [*title-line* | **NULL** | **BLANK**]

KEY *customer-id*, *channel* [,*start-date*] [,**SUM** | ,**NOSum**] [,**PEAk** | ,**NOPeak**] [,**CLAss**] [,**DEC**(*n*) | ,**DEC(2)**] [**CH1** ‘*head1*’] [**CH2** ‘*head2*’]

Heading Commands

You can use up to eight Heading Commands per block. Input one command per line.

- **Report** — You can input up to nine characters, including embedded blanks. Your input will appear in the upper left corner of the report. For statistical records, the report name is often used to record the title of the corresponding report produced by the Load Analysis programs; for example, “TGY311-01”.

  The default in the first block is all blanks. If you omit the REPORT Command in subsequent report blocks, the name defaults to the most recently issued REPORT Command.

- **Title-lines** — Use these commands to specify up to seven lines of report headings. Your input will appear at the top of the report page. For each title-line:

  TLn — use “n” to specify the line number, where “n” is an integer between 1 and 7.

  title-line — input up to 190 characters, including embedded blanks. Your input will be centered on the line automatically.

  NULL — input “NULL” if you want the nth line to be suppressed. The remainder of the report will be moved up one line.

  BLANK — input “BLANK” if you want the nth line to be blank.

The default in the first block is all blank lines. In subsequent reports, each title-line defaults to the title assigned in the previous report block.

Key Commands

Each Key Command defines an ELDB record to be printed in a column of the report. Oracle Utilities Load Analysis assigns the columns in the order in which you input them to the block.

> **Important Note:** You can have up to eight Key commands per each report block. Remember, all records within a block must be the same type. If you try to mix different types, the program will either abort or produce misleading results. The types are:

1. Customer Load Data Records
2. Entire Period Demands
3. Average Day Demands
4. Time-Of-Use Statistics.

Also, all time-of-use statistics in a block must have the same number of TOU periods and supplied peaks. All load data records in a block must have the same number of seconds-per-interval or be aggregated to the same level.

The format for the Key Command is shown in the box below. Input one command and its associated parameters per line; you can use commas and/or blanks to separate elements.

KEY *customer-id*, *channel* [,*start-date*] [,**SUM** | ,**NOSum**] [,**PEAk** | ,**NOPeak**] [,**CLAss**] [,**DEC**(*n*) | ,**DEC(2)**] [**CH1** '*head1*'] [**CH2** '*head2*']

- **Customer-id and channel-number** — You **must** input the customer-id and channel-number of the ELDB statistic or cut to be reported. (Remember, because statistic records are considered simulated cuts, "customer-id and channel-number" also means "statistics-name and stratum-number".)
- **Start** — An optional parameter, used to override the start-date specified in the Environment File. As explained under the Environment File Date Command (Figure 11-9: Sample Time Series Reporter Environment File), you can use this option to compare statistics for the same time period across different months. If specified, the data will be reported starting with the start-time and continuing until the number of intervals in the Environment File Date range have been reported.

  Input the date in the "mm/dd/yy" format.
- **Sum** — An optional parameter, used to direct the program to sum the values in the column and print the total at the bottom of the report. "NOSum" is the default.
- **Peak** — Use this optional parameter to indicate whether or not you want a peak time to be printed for each day in the reporting period, as well as a peak time for the entire period. If selected, this information is printed at the bottom of the report. "NOPeak" is the default.
- **Class** — An optional parameter, used to scale analysis statistics (sample mean and standard error of the mean) to the class level (class total and standard error). This parameter should not be used on Load Factors.
- **Decimal** — Use this optional parameter to specify that "n" digits are to follow the decimal point in the column; "n" is any integer between 0 and 5. The default is2.
- **Column-headings** — Use the optional parameters "CH1" and "CH2" to input the first and second lines of the column headings for the cut. Each heading "head1" and "head2" **must not** exceed 15 characters, and must be enclosed within apostrophes (' '). The program automatically provides headings for ELDB statistics records; for all other records, the default is blanks.

Figure 11-10: Sample Time Series Control File with Two Blocks of Commands is a sample Control File..

Block 1

```
REP     TGY310-XX
TL1     BLANK
TL2     TUTORIAL SAMPLE FOR TIME SERIES REPORTER
TL3     BLANK
TL4     COMBINED MEAN DEMANDS BASED ON DESIGNATED TYPE OF DAY
TL5     BLANK
TL6     NULL
TL7     NULL
KEY     RESI-AD-CMEN, 0, SUM, PEAK, DEC3, CH1 ‘AVERAGE,’ CH2 ‘DAY’
KEY     RESI-WD-CMEN, 0, SUM, PEAK, DEC3, CH1 ‘AVERAGE,’ CH2 ‘WEEKDAY’
KEY     RESI-WN-CMEN, 0, SUM, PEAK, DEC3, CH1 ‘AVERAGE,’ CH2 ‘WEEKEND’
KEY     RESI-WDH-CMEN, 0, SUM, PEAK, DEC3, CH1 ‘AVERAGE WKDAY,’ CH2 ‘HOLIDAY’
KEY     RESI-MXEN-CMEN, 0, SUM, PEAK, DEC3, CH1 ‘CLASS PEAK,’ CH2 ‘ENTIRE PERIOD’
KEY     RESI-MXT01-CMEN, 0, SUM, PEAK, DEC3, CH1 ‘CLASS PEAK,’ CH2 ‘TOU PERIOD 1’
KEY     RESI-MXT02-CMEN, 0, SUM, PEAK, DEC3, CH1 ‘CLASS PEAK,’ CH2 ‘TOU PERIOD 2’
KEY     RESI-MXP01-CMEN, 0, SUM, PEAK, DEC3, CH1 ‘SUPPLIED PEAK,’ CH2 ‘01’
```

Block 2

```
TL1     BLANK
TL2     TUTORIAL SAMPLE FOR TIME SERIES REPORTER
TL3     BLANK
TL4     TIME OF USE STATISTICS BASED ON SEPARATE MEANS
TL5     BLANK
TL6     NULL
TL7     NULL
KEY     RESI-NCD-SMEN, 0, DEC3, CH1 ‘NONCOINCIDENT,’ CH2 ‘DEMAND’
KEY     RESI-NGY-SMEN, 0, DEC3, CH1 ‘TOTAL,’ CH2 ‘ENERGY’
KEY     RESI-LFC-SMEN, 0, DEC3, CH1 ‘COINCIDENT,’ CH2 ‘LOAD FACTORS’
KEY     RESI-LFN-SMEN, 0, DEC3, CH1 ‘NONCOINCIDENT,’ CH2 ‘LOAD FACTORS’
KEY     RESI-DF-SMEN, 0, DEC3, CH1 ‘DIVERSITY,’ CH2 ‘FACTORS’
KEY     RESI-CF-SMEN, 0, DEC3, CH1 ‘COINCIDENCE,’ CH2 ‘FACTORS’
```

Figure 11-10 Sample Time Series Control File with Two Blocks of Commands

Step 3: Run the Time Series Reporter Program (Y410)

Once you have created the Environment and Control Files, you are ready to run the Time Series Reporter. Use Y410.

Time Series Reporting Processing

For each report block of Heading and Key commands, the program sets up the page and column headings, locates each cut in the ELDB, and prints the data. If supplied peak and/or time-of-use statistics are being reported, an appropriate label is placed in the first column of the report for each row of data. Otherwise, the first column in the report specifies the time of day for the corresponding row of data. The data is printed in the seconds-per-interval units specified in the AGGREGATE Command. *All ELDB cuts specified in a report block must have the same seconds-per-interval attribute, or be aggregated to the same level.* If the SUM parameter is specified in a KEY Command, the sum of the values in the column is calculated and printed at the bottom of the column for each day of the report. When the SUM option is specified for demand data (i.e., data with a unit-of-measure code of 02), the total reported represents summed energy values. Similarly, if the PEAK parameter of the KEY Command is in effect, the time of day when the peak occurs is printed for each day in the reporting period. In addition, the time of the peak over the entire period is printed at the end of the report. Illegal Heading commands will cause the program to terminate; illegal Key commands are merely ignored. All illegal commands and missing cuts are reported in an Error Log.

Load Data Reporter (Y420, Y430)

The Load Data Reporter produces detailed reports on individual statistics or customer load data records in the ELDB or SLDB. For load data records, you can report a cut, a cut series, or subsetted portions of cut series. You would typically use this program to investigate load data cuts before editing, or to look at the detailed information contained in a statistics record that is not shown in the analysis reports, such as population and weight.

The Reporter is very flexible and gives you many options for printing detailed information on customers or statistics records:

- **Load Data Report** — Includes descriptive information such as time span, minutes per interval, and unit of measure for customer load data records; or length of analysis period, population, and weight for statistics records.
- **Data Dump Report** — “Dumps” of interval data — i.e., a complete list of every interval in the record. For load data records, you can specify interval data in two formats:
    - *energy dumps* — pulse data multiplied by the pulse multiplier and added to the pulse offset
    - *demand dumps* — energy values multiplied by the number of recording intervals per hour.

  For statistics records, use **only** the Energy dump report — the demand dump will produce misleading or erroneous data.
- **Summary Report** — Summaries of peak minimum or daily data. You can request three types of summary report:
    - **peak summary** — The ten highest energy values in the cut, series, or subset, showing the value and time.
    - **minimum summary** — The ten lowest energy values in the cut, series, or subset, showing the time.
    - **daily energy, peak and minimum** — Total energy peak and minimum values for each day in the cut, series, or subset.

Samples of these reports are shown at the end of this section.

Special Note about Using the Load Data Reporter for Statistics

Follow the same steps when using the Load Data Reporter for either statistics or customer load data records. **However**, there are some important points to keep in mind when using the program to report statistical records:

1. Use the Reporter only for interval demands, **not** time-of-use statistics.
2. Report interval statistics using the Energy option, never the Demand option.
3. Never attempt to aggregate statistics.
4. Statistics will be printed in the customer load data report format. This means that, although the field identifiers appear the same on both types of records, they will have different meanings. These differences are thoroughly explained in *Header and Interval Data for Statistics Records* on page 3-10.

Steps for Using the Load Data Reporter

Summary—Using the Load Data Reporter (Y420, Y430)

1. Identify records to be reported and determine type of report needed for each one.
2. Create Environment File (TGX41B.ENV).
3. Create Control File (TGX41A.CTL).
4. Run Load Data Reporter (Y420 for ELDB, Y430 for SLDB).

Step 1: Identify Records to be Reported and Type of Report Needed for Each One

The flexibility of the Reporter enables you to quickly generate reports for a group of records in a single session. The report type can be the same for all records, or specially modified for each one.

Step 2: Create Environment File (TGX41B.ENV)

You define the contents and format of the reports using a combination of the Environment File and the Control File (Figure 11-16: Constructing Load Data Reports). In general, use the Environment File to define the basic report (in other words, the report structure you will want most often). Use the Control File to specify the records to be reported, and any modifications of reports required for specific records.

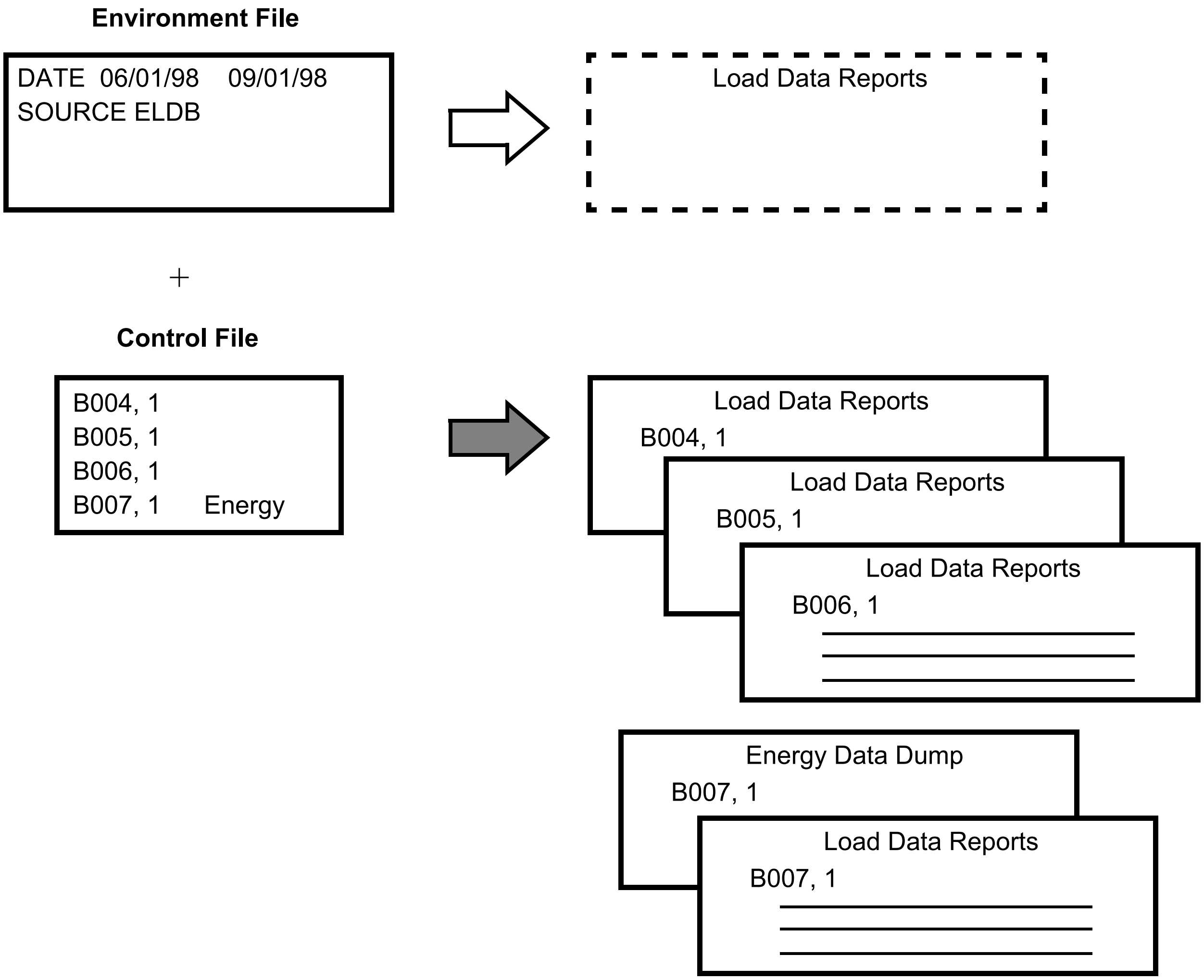


Figure 11-16 Constructing Load Data Reports

Create the Environment File with the following commands:

DATe [*start-time*] [*stop-time*]

SOUrce [**SLDB** [2] | **ELDB** [**BOTH**] [2]]
(*SLDB is for Y430, ELDB is for Y420*)

*** SUBset** [**YES** | **NO**]

*** AGGregate** [*n* | 0]

*** ROLling** [*n* | 3600] [‘*q*’ | ‘8’]

SCHedule [*t* | 0 [,**PRInt** | ,**NOPrint**]]

SEAson [*s* | 0 [,**PRInt** | ,**NOPrint**]]

SEParate [**PEAk**] [,**MINimum**]

* **DEMand**

ENErgy

NUMber [10 | 50]

PEAk [*n* | 10]

MINimum

DAIly

SUMmary

GRAph

XML

* Commands used for load data records only

DATe [*start-time*] [*stop-time*]

- **Date** — Use this command to identify the date range of the reports, where “start-time” specifies the beginning boundary of the date range and “stop-time” specifies the ending boundary of the date range. Those cuts with some portion of their data in the date range will be reported. You can use either the “mm/dd/yy-hh:mm:ss” or “mmddyyhhmmss” format. If you specify a start-time but no stop-time, the stop-time defaults to infinity. If you supply neither time, the DATE Command has no effect on requests.

SOUrce [**SLDB** [2] | **ELDB** [**BOTH**] [2]]
(*SLDB is for Y430, ELDB is for Y420*)

- **Source** — Use this command to specify the origin of the data you wish to report. “ELDB” must be specified with this command if you are using the ELDB Load Data Reporter (Y420); “SLDB” if you are using the SLDB Load Data Reporter (Y430).

SUBset [**YES** | **NO**]

- **Subset** — An optional command for customer load data records only. Specify “YES” if you want to report a set of merged cuts in the date range you specified with the DATE Command. You *must* specify a date range in order to use this command. If you do not specify a date range, or if either the start- or stop-time is missing in the DATE Command, the program will terminate.

AGGregate [*n* | 0]

- **Aggregate** — An optional command for customer load data records only. Use “n” to specify the seconds-per-interval for reporting interval dumps. For example, if you input “AGG 1800”, each interval would represent 1800 seconds (30 minutes). The default is no aggregation—the intervals would be reported in whatever seconds per interval they currently exist. If the interval length of the cut requested exceeds “n”, the request will be rejected.

  Depending upon the unit of measure, for load data the program will either *sum* or *average* the intervals when aggregating to a lower frequency. The aggregation method used by Oracle Utilities Load Analysis for each UOM is noted in *Appendix J: Oracle Utilities Unit of Measure Codes*.

ROLling [*n* | 3600] [‘*q*’ | ‘8’]

- **Rolling** — For customer load data records only — This command averages demands across intervals. This command is most often used for billing purposes and is a method for calculating peaks. Often rates for large customers contain a rolling demand clause, and this option is useful in those circumstances. Use “n” to specify the interval length you want to average (the result is called the “rolling interval”). “n” must be greater than, and a multiple of, the cut’s interval length. For example, let us say that your data exists in 900-second intervals and you have consecutive interval values of 8, 9, 8, and 16. If you made n=30 and applied the Rolling option, the 16 would become 12, that is, (8+16) /2=12. Use “q” to indicate the worst acceptable status code involved in the averaging.

SCHedule [*t* | 0 [,**PRInt** | ,**NOPrint**]]

- **Schedule** — An optional command. Use it to specify whether you want data reported by entire period or time-of-use periods. (Your utility’s time-of-use periods are specified at system setup in the Time-of-Use Schedule File.) Minimums, maximums, and energies will be reported for each TOU period in the schedule.

  Use “n” to specify the time-of-use period you want reported. The default is “0”, which means that the entire period will be reported. If you input a time-of-use period and you want to see a graph of it, specify “PRInt”, “PEAk”, and MINimum”. Do not specify PRInt if you did not input a schedule number. The default is “NOPrint”.

SEAson [*s* | 0 [,**PRInt** | ,**NOPrint**]]

- **Season** — Use this command to select a schedule from the Season Schedule File (TGY31E). Specifying a Season Schedule makes it possible to apply different time-of-use schedules to different portions of the analysis period.

  The parameter “s” is a non-negative integer representing a particular Season Schedule within the Season Schedule File (defined in Step 5 of this chapter). The default, “SEAson 0", indicates that a single Time-of-Use Schedule, as specified in the SCHedule Command, is to be applied over the entire analysis period.

  The PRInt option indicates that graphs of time-of-use periods are to be printed with the Analysis Environment Report; the NOPrint option suppresses the printing of these graphs. The default is PRInt.

  > **Note:** Either the Season Command or the Schedule Command may be used to define time-of-use periods for analysis processing, but not both. If you include both commands in the Environment File, the program will use the Season

Command and disregard the Schedule Command. If you include neither command, the default is “SCHedule 0, NOPrint”.

SEParate [**PEAk**] [,**MINimum**]

- **Separate** — An optional command when using the Season Command. Input the keyword “SEParate” to produce a separate Peak Summary and Minimum Summary report — a list of the one to 50 highest/lowest energy values in the cut or cut series, with times for each season.

DEMand

- **Demand** — An optional command for customer load data only. Input the keyword “DEMand” if you want the report to include a complete list of actual intervals in demand units (energy x number of intervals per hour). (***Note:*** Any data dumps requested in the Environment File *cannot* be turned off in the Control File.)

ENErgy

- **Energy** — An optional command. Input the keyword “ENErgy” if you want the report to include a complete list of actual intervals in energy units. (***Note:*** Any data dumps requested in the Environment File *cannot* be turned off in the Control File.)

NUMber [<u>10</u> | 50]

- **Number** — An optional command, used to specify the number of peaks and/or minimums reported for each cut on the Peak Summary and Minimum Summary reports. The default is 10 and the max is 50.

PEAk [*n* | <u>10</u>]

- **Peak** — An optional command. Input the keyword “PEAk” if you want the report to include a list of the 1 - 50 highest energy values of the cut or cut series, with times.

MINimum

- **Minimum** — An optional command. Input the keyword “MINimum” if you want the report to include a list of the 1 - 50 lowest energy values in the cut or cut series, with times.

DAIly

- **Daily** — An optional command. Input the keyword “DAIly” if you want the report to list the total energy, peak, and minimum values for each day in the cut or cut series.

SUMmary

- **Summary** — an optional command, equivalent to specifying PEAk, MINimum, and DAIly. Input the keyword “SUMmary” if you want all three of these reports. ***Note:*** Any of the three Summary reports requested in the Environment File *cannot* be turned off in the Control File.

GRAph

- **Graph**— An optional command. When present, all reported cuts will be extracted to a graphing file (SYSGRAPH).

XML

- **XML** — An optional command. When present, all reported cuts will be exported to a standard Interval Data XML file located in the job folder. This command also triggers the production of the SYSGRAPH.HTM file, also in the job folder, which can be used to graph the reported cuts.

Step 3: Create Control File (TGX41A.CTL)

The Control File is made of your report requests. Input one request per line. Each request consists of the key for the record you want to report, and any modifications or additions to the reports required for that record. In each request for load data records, you can specify a single cut or a cut series.

You will use the following format. Remember, you need to specify bracketed commands only when you want something other than what was specified in the Environment File. ***Note:*** Even though the commands illustrated below take up several lines, each one of your requests must fit on a single 200-character line. The descriptions of the commands are the same as those provided in Step 2.

customer-id, *channel* [,*start-time*] [,**ENErgy**] [,**DEMand**]

[**SCHedule** [*n* | 0 [,**PRInt** | ,**NOPrint**]]] [,**AGGregate** [*n* | 0]]

[,**ROLling** [*n* | 3600 [‘*q*’ | ‘8’]]]

[,**PEAk**][,**MINimum**][,**DAIly**][,**SUMmary**]

- **Customer-id** — Input the customer-id or statistics name of the record you want to report. *This is a required field.*
- **Channel** — Input the channel number or stratum number of the record you want to report. *This is a required field.*
- **Start-time** — If you want to report on a single cut, input its start-time (you can use either the “mmddyyhhmmss” or “mm/dd/yy-hh:mm:ss” format). If you do not specify a start-time, Oracle Utilities Load Analysis will use the date-range specified in the Environment File.

Here is a sample Control File.

```
B001, 1, 07/01/98-00:00:00  ENE
```

Step 4: Run the Load Data Reporter (Y420 or Y430)

Once you have created the Environment File and the Control File you are ready to run the Load Data Reporter. Use Y420 for the ELDB or Y430 for the SLDB.

Load Data Reporter Processing

The Load Data Reporter Program checks the Environment File to determine what options have been chosen and if they are consistent. The following conditions halt processing.

- Subset mode specified without a date range or with an incomplete date range (i.e., a start-time and no stop-time)
- An invalid aggregation level (i.e., a level that is lower than the data's original level of aggregation)
- An invalid rolling level of aggregation (same as aggregation problem above)
- A rolling level of aggregation equal to the data's original level of aggregation
- Subset specified and cuts not eligible for merge.

Each key in the Control File is processed by finding a corresponding cut or cut series in the ELDB or SLDB. When a date range is specified in the Environment File, if the start-time of the request key (if stated) is not within the date range, an error message is produced and processing continues with the next key in the Control File. If subset is set to "YES", one report is generated that includes data from one cut (if the request key is a full key), or from a cut series whose data falls within the date range specified. If subset is set to "NO", a report for each cut that has data within the date range is generated, or one report is produced for a full key request. **WARNING**: When data is aggregated, the original start- and stop-times of the ELDB or SLDB cut are used for comparison with the date range. A stop-time of the reported cut is calculated using the number of recorded intervals, and may differ from the original cut stop-time if data is missing.

If date range is set to "ALL", data for all cuts in the ELDB or SLDB with the same customer-id and channel as the request key is selected, and a descriptive report is generated for each cut. If the request key is a full key, one report on one cut is produced.

If aggregation and/or subsetting are requested, the stop-time, recorded and expected intervals, and total energy of the reported cut are calculated from information from an ELDB or SLDB cut or cuts; *meter data is set to zero. Printing of the validation messages is suppressed* because these messages do not apply to the synthesized cuts reported. If at least one of the options "Energy" or "Demand" are specified, an interval data report(s), a Peak Summary Report(s), a Minimum Summary Report(s), and a Daily Energy, Peak and Minimum Report(s) will follow the descriptive data report. **WARNING**: If ROLling is specified, and if the status code of each interval is less than or equal to the worst acceptable status code stated in the Environment File, the interval is not included in the average.

If the SCHEDULE Command is included in the Environment File, then all cuts will have the Peak Summary, Minimum Summary, and Daily Energy, Peak and Minimum reports as part of their output. If a schedule number other than zero is chosen, these reports will be broken down by the time-of-use period associated with that schedule number. If the "PRInt" option is chosen, time-of-use period graphs will be printed as part of the output; otherwise, these are omitted.

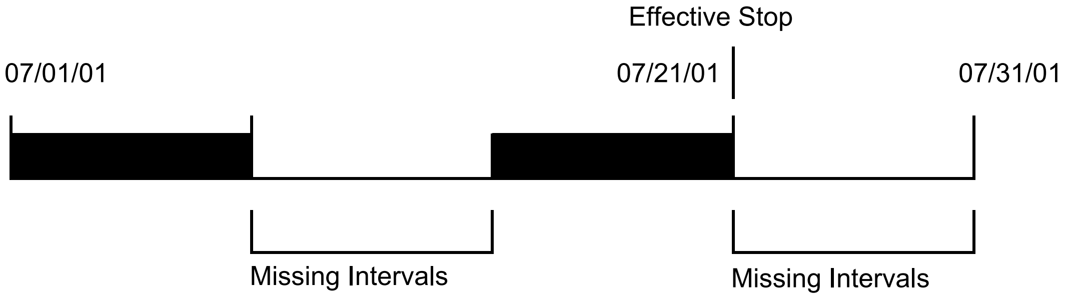
The Summary Reporter (Y440, Y460)

The Summary Reporter is used to list the contents of the ELDB or SLDB. In contrast to the analysis reports, which filter data according to user-defined quality standards, the Summary Reporter can list *all* records that exist in the database. You can get a hard copy listing of every record in the ELDB or SLDB (both statistics and customer load data records), of selected cut series, and/or of all records within a specified time period. The Summary Reporter can also generate useful statistics about each database—including the number of records per month and the total number of records in the database.

You may find it helpful to use the Summary Reporter to generate a hard copy listing of the entire contents of the ELDB or SLDB, and to keep the report nearby as a handy directory.

The Summary Reporter is also useful for answering questions about the quality of extracted load data. Specifically, the "% COMP" (that is, Percentage Complete) column can quickly indicate the quality of a cut.

For instance, in the report above, we see that the cut "B253" should have contained data up to the end of the month (the extracted stop-date/time is 07/31/01-23:59:59). However, the effective stop-date/time tells us that the data ends on 07/21/01-23:59:59. Also, because the cut was only 50% complete (that is, has half of the expected data), but the effective stop-date represented 3/4 of the month, we know there must be more gaps in the data. In fact, the cut might look something like this:



Steps for Using the Summary Reporters

The following pages describe the steps for using the Summary Reporter with either the ELDB or SLDB Summary Reporter procedures.

Summary—Using the ELDB Summary Reporter (Y440, Y460)

1. Determine whether you want a report on the entire database or on selected records. If you want a report on the entire database, go to Step 3. If you want selected records only, create the Control File (TGY44A.CTL).
2. If you want to report data within a specified date range, create the Environment File (TGY44B.ENV).
3. Run the Summary Reporter Program .

Step 1: Create the Control File (TGY44A.CTL) to Select Specific Cuts for Reporting

If you want to report the entire contents of the database, go to Step 3. The Control File (Figure 11-26: First Portion of a Sample Control File) is a list of the cuts and/or statistics records you want to report. You can create the file manually, generate it with the Customer Data Extraction Program, or create it with the ELDB or SLDB Key Generator Program.

Each report request has the following format.

For load data records:

Customer-id, channel-number

Enter one request per line.

```
B001,  1
B002,  1
B003,  1
B004,   1
•
•
•
```

Figure 11-26 First Portion of a Sample Control File

Step 2: To report cuts within a date range create the Environment File (TGY44B.ENV)

Use the Environment File to specify a date range. You can report on all cuts in the database that fall within that range or, if you supply a Control File, those portions of the specified cut series that fall within the date range.

Create the Environment File with these three commands:

DATe [*start-time stop-time* | **ALL**]

SELect [**KEY** | **ALL**]

SOUrce { **ELDB** | **SLDB**}

- **Date** — Use this command to set the start- and stop-time of the reporting period. If you specify both a start-time and a stop-time, Oracle Utilities Load Analysis will report all selected cuts containing intervals at or between the two times. If you specify only the start-time, Oracle Utilities Load Analysis will report all selected cuts containing intervals at or after the specified start-time. Use the “mm/dd/yy” format. The “ALL” option reports all selected cuts, regardless of start- or stop-times. ALL is the default.

If you use the “ALL” option followed by a stop-time, Oracle Utilities Load Analysis will report all selected cuts containing intervals at or before the specified stop-time.

- **Select** — Use this command to indicate which cut series you want reported. “ALL” indicates that you want every cut in the database that falls within the specified date range. “KEY” indicates that you want only those customers whose keys appear in the Control File to be reported. ALL is the default.
- **Source** — Use this command to identify which format you want the cuts reported in. This is a required command. Specify “ELDB” if you wish to execute the ELDB Summary Reporter (Y440) and have the data reported in the ELDB format. Specify “SLDB” if you wish to execute the SLDB Summary Reporter (Y460) and have the data reported in the SLDB format. If you wish to report data in the CLDB or ALDB format, see *Chapter 12* in the *Oracle Utilities Load Analysis Load Data Management User’s Guide*, for specifics.

Here is an example of an Environment File for the ELDB Summary Reporter.

```
DATE    07/01/01    07/31/01
SELECT  KEY
SOURCE  ELDB
```

Figure 11-27 Example of an Environment File for the ELDB Summary Reporter

The example for the SLDB Summary Reporter is identical, except “SOURCE SLDB” is used.

Step 3: Run the Summary Reporter

Submit the job.

SLDB Summary Reporter Processing

When “SELECT ALL” mode is used, each cut on the ELDB or SLDB that falls within the desired date range is reported.

When “SELECT KEY” mode is used, only those cuts whose keys appear in the Control File and are within the desired date range are reported. If a key is not found, an error message is generated and processing continues with the next Control File.

Chapter 13

Computing Customer Energy Use by Billing Cycles Using the Billed Energy Program (Y230)

It is frequently necessary to analyze customer energy use on a billing cycle basis — for ratio expansions, for a company energy sale study, or for other tasks. However, accurate values for individual customer use for monthly billing cycles may not be readily available. The information may be too difficult to extract from "Billing," or it simply may not exist for all customers in an analysis.

This chapter explains how to use the Billed Energy Program to compute customer energy usage on a billing cycle basis from interval demand data that is available in a Oracle Utilities Load Analysis database.

Topics included in this chapter are:

- **Why Accurate Energy for Billing Periods Is Important to Ratio Analysis**
- **What Does the Billed Energy Program Do?**
- **Steps for Using the Billed Energy Program (Y230)**

Why Accurate Energy for Billing Periods Is Important to Ratio Analysis

Oracle Utilities Load Analysis's Ratio Analysis, Domains Ratio, and Coincident Peak Analysis programs utilize the ratio expansion methodology to estimate class totals from sample customer data. The ratio of demand to billed energy for each interval, expanded by the sum of class bills, is used to obtain class total demand estimates.

Ratio expansion depends on accurate billed energy values for each customer in the sample, for the same periods over which the class bills were totaled. However, this information is often difficult to obtain from Billing.

One way to get the information is to direct the Oracle Utilities Load Analysis Analysis program to derive customer energy values from interval demand data in the Oracle Utilities Load Analysis database. This approach is not entirely satisfactory, however. The Analysis program computes energy values for all customers over the same date range, but the population is actually divided into groups whose monthly billing cycles begin on different days of the month. Thus the computed values for the sample customers do not accurately reflect the variety of date ranges over which the population billed energy was recorded.

This chapter explains how to use the Billed Energy Program to overcome this problem — that is, how to compute energy usage for customers on a billing cycle basis using interval demand data that is available in the Oracle Utilities Load Analysis database. The program also produces an output file formatted for use as the Control File for Analysis programs.

What Does the Billed Energy Program Do?

The Billed Energy Program is designed to read interval data from the Oracle Utilities Load Analysis database and compute total energy between an arbitrary date range for specified customers. It may be used on the CLDB or ELDB, but does require valid records. The data may be of any time frequency, and may be spread across any number of cuts.

You specify a list of customers and their individual billing cycle numbers, along with a file that defines the start- and stop-date of each cycle. You may also specify blocks of customers whose records are to be accumulated and written back to the database as a single combined cut. The program automatically finds all interval data for each customer cycle that meets or exceeds a user-defined quality standard, prorates the data to adjust for missing or excluded intervals (if desired), and computes the total or billed energy. The program outputs a series of diagnostic reports, and a file that you can use as input to the Standard, Ratio, Domains, 100% Sample, or Coincident Peak Analysis programs, or to a custom external application. If block processing is performed, the program writes the combined cut(s) to the database; and in such a case information for the combined cut, rather than any of the block of cuts used to create it, is written to the output file. You may therefore find the program useful for accumulating cuts from different recorders and creating Control File records in preparation for running one of the above-mentioned Analysis programs, whether or not you not wish to calculate their billed energy.

Steps for Using the Billed Energy Program (Y230)

Here is a list of the steps you will follow when using this program. The remainder of this chapter explains each step in detail.

Summary — Using the Billed Energy Program (Y230)

1. Make sure that the interval data you wish to use for computing billed energy is available in the CLDB or the ELDB.
2. Create the Billed Energy Control File (TGY23A.CTL) — a list of the customers whose billed energy you want to compute.
3. Create the Billed Energy Cycle File (TGY23X.CYC) — a set of billing cycles and their start- and stop-dates.
4. Create the Billed Energy Environment File (TGY23B.ENV) — a group of commands you use to specify processing options.
5. Run the Billed Energy Program (Y230).

Figure 12-2: Example Billed Energy Control File summarizes the inputs you must provide and the outputs you can expect.

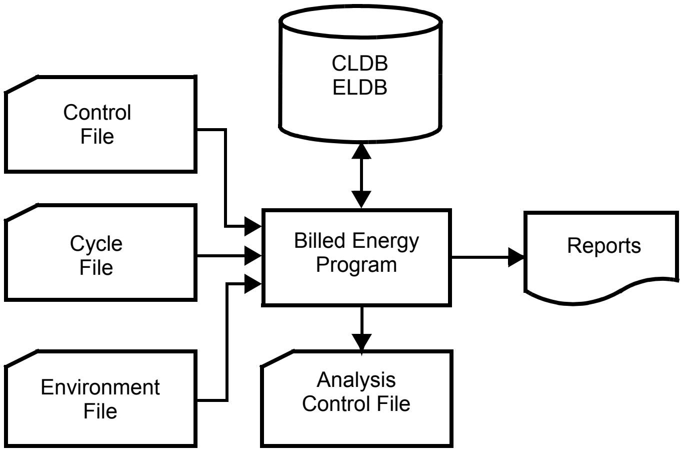


Figure 12-1 Overview of the Billed Energy Program

Note: This program supports pre-process key generator. See **Using the Preprocess Key Generator in a Control File** on page 4-4 for more information.

Step 1: Ensure Interval data used for computing Billed Energy is available in the ELDB

You can apply the Billed Energy Program to data in the ELDB. The data can be in any frequency, and spread across any number of cuts.

Step 2: Create the Billed Energy Control File (TGY23A.CTL)

The Billed Energy Control File (Figure 12-3: Example Billed Energy Control File (Continued)) contains a list of keys identifying the customers to be processed. It may contain three kinds of records: the Block record, the End record, and the Individual Customer Control File record.

The Individual Customer record may have one of four formats, depending on the Analysis Type specified in the Environment File; the default is Ratio/Coincident Peak Analysis. You must provide one record for each customer, using one of the formats in the boxes below. There is no limit to the number of records in a file, and customer-ids may be repeated with different cycle numbers. Within the file, Individual Customer records can be placed in any order, except where constrained by Block and End records. Within a record, the parameters must be provided in the order shown. Parameters may be separated by blanks or by a comma. *The "+ or -" parameter shown at the beginning of each format is valid only on records within an accumulation block, i.e., entered between a Block and an End record. On such records within a block, the parameters following channel-number are ignored, and may therefore be omitted.*

Because billed energy is not input to the Standard, Domains Mean-per-Unit, and 100% Sample Analysis programs, it is not calculated by the Billed Energy Program for these Analysis Types, and therefore no cycle-number is required on their Control File records. For the other Analysis Types (Ratio/Coincident Peak and Domains Ratio), billed energy is calculated *unless* you specify the NOCALCULATE parameter on the TYPE Environment File Command. In that case, cycle-number may be omitted from these Control File records also; otherwise, it is required.

Standard Analysis Control File Record Format (Individual Customer)
[±] customer-id, channel-number [{ ± } chan1 [{ ± } chan2...]], stratum-number
[, cycle-number]

Ratio or Coincident Peak Analysis Control File Record Format (Individual Customer)
[±] customer-id, channel-number [{ ± } chan1 [{ ± } chan2...]], stratum-number
[, cycle-number]

Domains Mean-per-Unit Analysis Control File Record Format (Individual Customer)
[±] customer-id, channel-number [{ ± } chan1 [{ ± } chan2...]], stratum-number [,domain]

Domains Ratio Analysis Control File Record Format (Individual Customer)
[±] customer-id, channel-number [{ ± } chan1 [{ ± } chan2...]], stratum-number, domain [,cycle-number]

100% Sample Analysis Control File Record Format (Individual Customer)
[±] customer-id, channel-number [{ ± } chan1 [{ ± } chan2...]

The Block and End records are used if data represented by two or more Individual Customer records is to be combined. The Block record initiates an accumulation block: it is placed before the Individual Customer records that are to be accumulated, and the End record is placed after them. The energy represented by the Individual Customer records in an accumulation block is combined in accordance with the + or - signs on the individual records (default is +, if omitted), and the result is written back to the database as a cut identified by the customer ID and channel on the Block record and the start-time specified in the Environment File DATE Command (which is required for block processing). This Block cut, rather than the Individual Customer cuts that were combined to produce it, is then processed by the Billed Energy Program.

The Block record begins with the keyword BLOck, may not contain the + or - sign, and specifies only one channel. In other respects Block records are similar to Individual Customer records for their respective Analysis types.

Block record: Standard Analysis Type
BLOck new-customer-id, new-channel-number, stratum-number

Block record: Ratio/Coincident Peak Analysis Type
BLOck new-customer-id, new-channel-number, stratum-number [, cycle-number]

Block record: Domains Mean-per-Unit Analysis Type
BLOck new-customer-id, new-channel-number, stratum-number [, domain]

Block record: Domains Ratio Analysis Type
BLOck new-customer-id, new-channel-number, stratum-number, domain [, cycle-number]

Block record: 100% Sample Analysis Type
BLOck new-customer-id, new-channel-number

The END record serves to terminate an accumulation block. Having no parameters other than END, it is the same for all Analysis Types.

End record

END

- **customer-id, channel-number** — enter the Oracle Utilities Load Analysis customer-id and channel number (required).
- **stratum-number** *(not required if the TYPE Environment File Command specifies 100% Sample Analysis)* — enter the number that defines the stratum to which the customer belongs. The number may be any value from *1 to 99*, and is only passed to the output file. If the Billed Energy Program is being used to provide input to a Standard, Ratio, or Domains Mean-per-Unit Analysis that will use floating stratification, then any 2-digit number may be used. Otherwise, it **should** correspond to the sample *stratum number* assigned to each customer.
- **domain** *(required if the Analysis Type is Domains Ratio, optional if Domains Mean-per-Unit)* — enter the number or letter that identifies the domain to which the customer belongs. This must be a number from to *1 to 9, inclusive,* or a letter from *A to Y, inclusive*. This field may be left blank for a Domains Mean-per-Unit Analysis, in which case domain 0 is assumed.

cycle-number *(required if the Analysis Type is Ratio or Domains Ratio, unless the NOCalculate Environment File option is specified)* — the billing cycle for the customer. This number *must correspond to an entry in the Cycle File (described in the next step), or the customer will be rejected*. This number determines the time period for the billed energy calculation. The value must be *between 1 and 40*.

Figure 12-3: Example Billed Energy Control File (Continued) gives examples of a Billed Energy Control File for each Analysis Type.

For Standard Analysis:

```
        N1723           1               05                       Note: No cycle-number
        N1725           1+2             05
        N1727           1               05
        N1736           1               05
        N1739           1               05
        N1742           2                6

        BLO     TOT202  1        6                       <---- Start of accumulation block
        N2024           1+2                                      (6 cuts will be accumulated)
+       N2025           1
-       N2026           3+4
        N2027           1                                        (“+” is the default operation)
        END                                                      <---- End of accumulation block
                                                                 TOT202,1  cut will be written to database;
                                                                  start-time = Env. File start-time
        P1809           1                6
        P1810           1+3-2            5
        P2769           2                6
```

For Ratio/Coincident Peak Analysis:

```
        N1723           1               05              7
        N1725           1+2             05              6
        N1727           1               05              5
        N1736           1               05              10
        N1739           1               05              10
        N1742           2                6              16
        BLO     TOT202  1        6              16      <---- Start of accumulation block
        N2024           1+2
+       N2025           1
-       N2026           3+4
        N2027           1
        END                                                      <---- End of accumulation block
        P1809           1                6              24
        P1810           1+3-2            5              10
        P2769           2                6              16
```

For Domains Mean-per-Unit Analysis:

```
        N1723           1               05              1        Note: No cycle number
        N1725           1+2             05                       (Default domain is 0)
        N1727           1               05              2
        N1736           1               05              2
        N1739           1               05              1
        N1742           2                6              1
        BLO     TOT202  1        6              2       <---- Start of accumulation block
        N2024           1+2
+       N2025           1
-       N2026           3+4
        N2027           1
        END                                                      <---- End of accumulation block
        P1809           1                6              1
        P1810           1+3-2            5              1
        P2769           2                6              2
```

Figure 12-2 Example Billed Energy Control File

For Domains Ratio Analysis:

```
          N1723               1                   05                  1          7
          N1725               1+2                 05                  2          6
          N1727               1                   05                  2          5
          N1736               1                   05                  2         10
          N1739               1                   05                  1         10
          N1742               2                    6                  1         16
          BLO       TOT202    1          6                  2         16        <---- Start of accumulation block
          N2024               1+2
+         N2025               1
-         N2026               3+4
          N2027               1
          END                                                                               <---- End of accumulation block
          P1809               1                    6                  1         24
          P1810               1+3-2                5                  1         10
          P2769               2                    6                  2         16
```

For 100% Sample Analysis:

```
          N1723               1                                                 Note: No stratum-number or cycle-number
          N1725               1+2
          N1727               1
          N1736               1
          N1739               1
          N1742               2

          BLO       TOT202                                              <---- Start of accumulation block
          N2024               1+2
+         N2025               1
-         N2026               3+4
          N2027               1
          END                                                                     <---- End of accumulation block
          P1809               1
          P1810               1+3-2
          P2769               2
```

Figure 12-3 Example Billed Energy Control File (Continued)

Step 3: Create the Billed Energy Cycle File (TGY23X.CYC)

The Cycle File (Figure 12-4: Example Billed Energy Cycle File) consists of billing cycles and their start and stop dates. Each cycle is described by a single record made up of three parameters, as shown in the box below. Any number *up to a maximum of 999 cycles* may be specified. Typically there are 20 or 21 billing cycles that are used for all customers. Within a record, the parameters must be provided in the order shown, and may be separated by blanks or a comma.

> The Cycle File is not required if the Analysis Type specified in the TYPE Environment File Command is MPU, DMP, or 100, or if the NOCalculate parameter is specified with Type RATio or Type DRAtio.

Cycle File Record Format:

```
cycle-number, start-date, stop-date
```

- **cycle-number** (*required*) — a 1- or 2-digit number that identifies the cycle.
- **start-date, stop-date** — Enter the start- and stop-date of the cycle using the format: MM/DD/YY. *The date range must not specify a time span greater than the number of days set with the Length Command in the Environment File.*

> **Note:** The billed energy will be calculated for the specified period, beginning at noon on the start-date and ending at noon on the stop-date.

```
1   05/01/00                 05/20/00
2   05/02/00                 05/21/00
3   05/03/00                 05/22/00
4   05/04/00                 05/23/00
5   05/05/00                 05/24/00
6   05/09/00                 05/27/00
7   05/10/00                 05/28/00
8   05/11/00                 05/30/00
9   05/12/00                 05/30/00
10  05/13/00                 06/01/00
```

Figure 12-4 Example Billed Energy Cycle File

The Environment File contains commands that guide the processing of each customer's data by the Billed Energy Program. There are seven separate commands. The file format is shown in Figure 12-5: Format of the Billed Energy Environment File.

Step 4: Create the Billed Energy Environment File (TGY23B.ENV)

When creating the file, enter one command per line. Each line must begin with the command name (keyword); but you need enter only the first three letters of the keyword. You may enter the commands in any order. If you do not specify a command, the program will assume the default (underlined). You may use blanks or a comma to separate parameters within a line.

LENgth [*n* | 40]

PROrate [**YES** | **NO**]

QUAlity ['*s*' | '8']

DATe *mm/dd/yy mm/dd/yy*

TYPe [**MPU** | 100% | **DMPu** | **DRAtio** | **RATio**] [**NOCalculate** | **CALculate**]

AGGregate [300 | 900 | 1800 | 3600]

REPlace [**YES** | **NO**]

Figure 12-5 Format of the Billed Energy Environment File

TYPe [**MPU** | 100% | **DMPu** | **DRAtio** | **RATio**] [**NOCalculate** | **CALculate**]

- **Type** — indicates the Analysis Type for which Control File records will be entered, and for which records will be written to the output file. The first parameter describes the Analysis Type, and is required. The options are:

  MPU — Mean-per-Unit (Standard) Analysis
  RATio — Ratio Analysis (format also used for Coincident Peak Analysis)
  100% — 100% Sample Analysis
  DMPu — Domains Mean-per-Unit Analysis
  DRAtio — Domains Ratio Analysis.

The optional second parameter indicates whether Billed Energy is to be calculated for the cuts named in the Control File. This parameter is meaningful only for the Ratio and Domains Ratio Analysis Types, because Billed Energy may be calculated only for these types. If the second parameter is not specified for these Types, the default is CALculate. If the TYPe Command is not coded at all, the default is RATio CALculate.

DATe *mm/dd/yy mm/dd/yy*

- **Date** — specifies the start-time and stop-time for cuts that are to be written to the database by the program. This command is **required** if the Analysis Type is **MPU**, **100**, or **DMP** (see above), or if Block accumulation is to be performed (see the BLOck Control File Command);

both a start-time and a stop-time must be entered. If the Analysis Type is Ratio or Domains Ratio and Billed Energy calculation is to be performed, the date range of any cycle in the Cycle File that is referenced on a Block Command must fall within this Environment File Date Range. Hours, minutes, and seconds are ignored: the start-time is assumed to be 00:00:00, and the stop-time 23:59:59.

AGGregate [300 | 900 | 1800 | 3600]

- **Aggregate** — specifies the interval length in seconds of Block cuts to be written to the database. Acceptable values are 300, 900, 1800, and 3600. If the AGG Command is not used, the default interval length is 3600 seconds (1 interval/hour).

REPlace [YES | NO]

- **Replace** — indicates whether a Block cut written to the database may replace an existing cut that has the same key. The default is NO.

LENgth [*n* | 40]

- **Length** — specifies the maximum allowable time span of a billing cycle in days. The program automatically checks each entry in your Cycle File. If the time span of the start- and stop-dates is greater than the length value, it is flagged as an error. The *maximum allowable value is 400;* the default is 40.

PROrate [YES | NO]

- **Prorate** — determines whether or not energy proration is performed. If set to YES, then the total energy of all good intervals is multiplied by the ratio of the total number of intervals divided by the number of good intervals. This is a simple linear estimate of total energy to account for missing intervals. The default value is NO, in which case the value for billed energy is the sum of the good intervals only.

QUAlity ['*s*' | '8']

- **Quality** — makes it possible to filter out data with poor status codes. Any interval with a code worse than the specified status value is treated as missing data. The default is '8', which allows use of all data except that with a missing status. If many intervals are excluded with the Quality Command, you should consider using PRORATE to provide a better estimate of billed energy.

Step 5: Run the Billed Energy Program (Y230)

Once you have created the necessary input files, you are ready to run the program. Use Y230.

Billed Energy Program Processing

The Environment File is read first. Each command is processed, and defaults are used for any commands not specified. An Environment Report is printed with each command, providing its values and any error messages. If an error occurs, the program stops; otherwise, it reads the Cycle File, if required (for example, if the Analysis Type is Ratio or Domains Ratio and NOCalculate has been specified). Cycles are processed and checked. The Cycle Report mirrors the start and stop dates of each cycle, with any error messages included. If an error is encountered, the program stops.

The primary processing is driven by the Control File. Each record is read and checked. When a Block record is read, if Billed Energy is to be calculated, the date range of the cycle specified is checked to make sure it is within the Environment File date range, and an accumulation array allocated. When an Individual Customer record is read within an accumulation block (between a Block and an End record), the database is read for that customer-id and channel over the Environment File date range, and its energy is either added to or subtracted from the Block accumulation array. For a valid Individual Customer record that is not within an accumulation block, *if the CALculate option is in effect*, the appropriate cycle dates are accessed. *Intervals from noon on the cycle start date to noon on the cycle stop date are read from the database.* All intervals with status codes equal to or better than the Quality parameter are totaled for the period. If proration is requested, this total is multiplied by the number of intervals in the period divided by the number of good intervals totaled. Note that if the number of good intervals is small in comparison to the total intervals, the prorated energy estimate may not accurately reflect customer usage.

When an End record is read, a cut is created for the customer-id and channel indicated on the preceding Block Command, and the start time from the Date Command, containing the energy accumulated from individual cuts in the accumulation block. This cut is written to the database, and is then processed by the Billed Energy Program in the same manner as an (unblocked) Individual Customer cut.

Corresponding to each Control File input record are one or more output lines in the Execution Log. For each Individual Customer record, there is a line showing the input values, any error messages, and, for a record that is not within an accumulation block, the computed billed energy if the CALculate option was in effect. No calculated billed energy is shown for a record within an accumulation block. Errors may occur if the input parameters are incorrect, the cycle number does not correspond to a Cycle File entry, or if the data cannot be found in the database. A Block record triggers the printing of a block separation line, as well as the input information from the Block Command and the new block cut’s start-time (as determined by the Date Command). An End Command produces another block separation line, followed by a line indicating the processing of the block accumulation cut written to the database, if block processing was successful.

If no error occurs in the processing of either an unblocked Individual Customer record or an entire accumulation block, then an output record is created for analysis. The output record’s format depends on the Analysis Type and Calculate/Nocalculate status. An output record is created for an Individual Customer record that is not part of an accumulation block, a single block output record is created for an accumulation block, using the customer-id and channel provided on the Block Command. No output record is created for a customer or a block for which a processing error is reported in the Execution Log.

Chapter 14

Key Generators — Shortcuts for Creating Input Files and Reports

This chapter explains how to work with the Key Generator programs. These programs enable you to create lists of records that match user-defined criteria. They are particularly useful for quickly generating Control files for other programs — such as Load Data Extraction, Standard Load Analysis, Ratio Analysis, Load Data Editor, and the Reporter programs.

Because these programs are very powerful, they are somewhat complex. It is recommended that you read this chapter carefully — with special attention to the section on the Control Language — before actually using them.

Topics covered in this chapter are:

- **What Is the Purpose of Key Generators?**
- **Introducing the Control Language**
- **Control Language — Logic and Structure**
- **Sample Control Files for Key Generators**
- **Using the Key Generator Programs**

What Is the Purpose of Key Generators?

Suppose that you have been asked to analyze the load pattern for your utility's residential customers with all electric heating. One of your first tasks would be to get a list of the appropriate customers in the sample and to input their IDs in a Control File for the Analysis program. It could be a long and time-consuming process to look up each customer's end-use and manually type in each key.

Fortunately, Oracle Utilities Load Analysis can perform tasks like these for you automatically. The system includes a set of programs that enable you to quickly identify and list customers and database records that match user-defined criteria. The programs are very flexible and the specific criteria are up to you. You can request that the lists be output as reports, or as files that you can, in turn, use as Control files for other programs.

The programs are called the "Key Generator programs." The **Key Generator programs** allow you to request a list of cut keys, statistics identifiers, or edit blocks on the basis of *any field or fields that exist in the standard Oracle Utilities Load Analysis Load Data Records or Statistics Records.* For example, you can ask for all customers that have a particular identifier code, or all cuts that have a forced merge field, or all cuts that have a particular start-date, or all statistics from a particular class load study.

Oracle Utilities Load Analysis has four Key Generator Programs — one for each of the four Oracle Utilities Load Analysis databases — and a fifth, more specialized program for generating analysis Control files. The **CLDB Key Generator** and **ALDB Key Generator** programs are used to create lists of full keys, partial keys, or edit blocks from records in the CLDB and ALDB, respectively, and are particularly useful for creating Control files for the Load Data Reporter, Load Data Editor, and Load Data Extraction programs. The **ELDB Key Generator** and **SLDB Key Generator** are used to create lists of full or partial keys from load data and/or statistics records in the ELDB or SLDB. They are especially useful for creating Control files for the Analysis and Direct Output programs.

The following pages provide an introduction to the Key Generator programs. We will first take a close look at the Control Language that enables you to construct your data requests in the programs. Then we will go through the steps for actually using each program.

Introducing the Control Language

To use the basic Key Generator programs, you will need to construct a Control File using Oracle Utilities Load Analysis's powerful "Control Language" (Figure 13-1: Using the Control Language). This language enables you to tell Oracle Utilities Load Analysis how to construct the list of desired keys or edit blocks. Essentially, you specify the logic that Oracle Utilities Load Analysis uses to evaluate each record in the database to determine whether it meets your criteria.

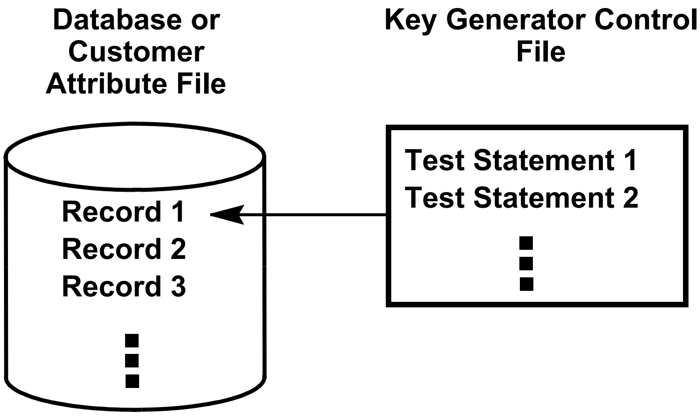

Database or Customer Attribute File
Key Generator Control File
Test Statement 1
Test Statement 2
Record 1
Record 2
Record 3

Figure 13-1 Using the Control Language

You construct a list of test statements that establish your criteria for desired records. Oracle Utilities Load Analysis applies each test statement to the first record to determine whether or not it matches your criteria. After testing the first record, Oracle Utilities Load Analysis applies the set of test statements to the second record, then the third, and so on until the program has examined the entire database file, or it encounters a STOP Command.

Control Language — Logic and Structure

To learn more about the variables used in the key generator control file, see *Appendix K: Key Generator Variable Lists*.

As shown in the example below, the Control Language consists of three major elements:

① Comments →

```
/*** GENERATE KEY LIST FOR CUSTOMERS BEGINNING WITH A THREE ***/
/*** LETTER PREFIX AND WITHIN A GIVEN DATE RANGE ***/
```

② Test Statements →

```
RECTYPE = ‘ ‘       T(L1)       F(STOP)
L1 : CUSTID = ‘B00’T(L2)        F(NEXT)
L2 : STARTDAT >= 02/01/98  T(L3)       F(NEXT)
L3 : STARTDAT <= 02/28/98  T(PRINT 1)F(NEXT)
```

③ Format Statements →

```
FORMATS :
1 : CUSTID ‘ ’ CHANNEL ‘ ’ START
```

Test statements **must** precede Format statements. Comments can be placed anywhere in the file. Let's look briefly at each element:

1. **Comments** — optional notes that do not affect processing. You can use them to record the purpose of the file, for example. ***Note:*** You must enclose your comments in these symbols: /* and */. Do not split comments across lines, unless you begin and end each line with the slash/asterisk symbols. Do not enter the slash/asterisk symbols in columns 1 and 2 of the file.

2. **Test Statements** — compare a single field in each record (called the “variable”) to your criteria (called the “test-value”), and indicate what action should be taken depending upon the results of the comparison.
3. **Format Statements** — specify how the results should be organized in the report or output file (called the “Extracted Data File”). You can specify what information you want printed (including data from any fields in the selected records, as well as titles and notes) and how you want the information organized in the file or on the page. Format statements are typically activated by PRINT instructions in test statements (Figure 13-4: Sample Control File and Its Results).

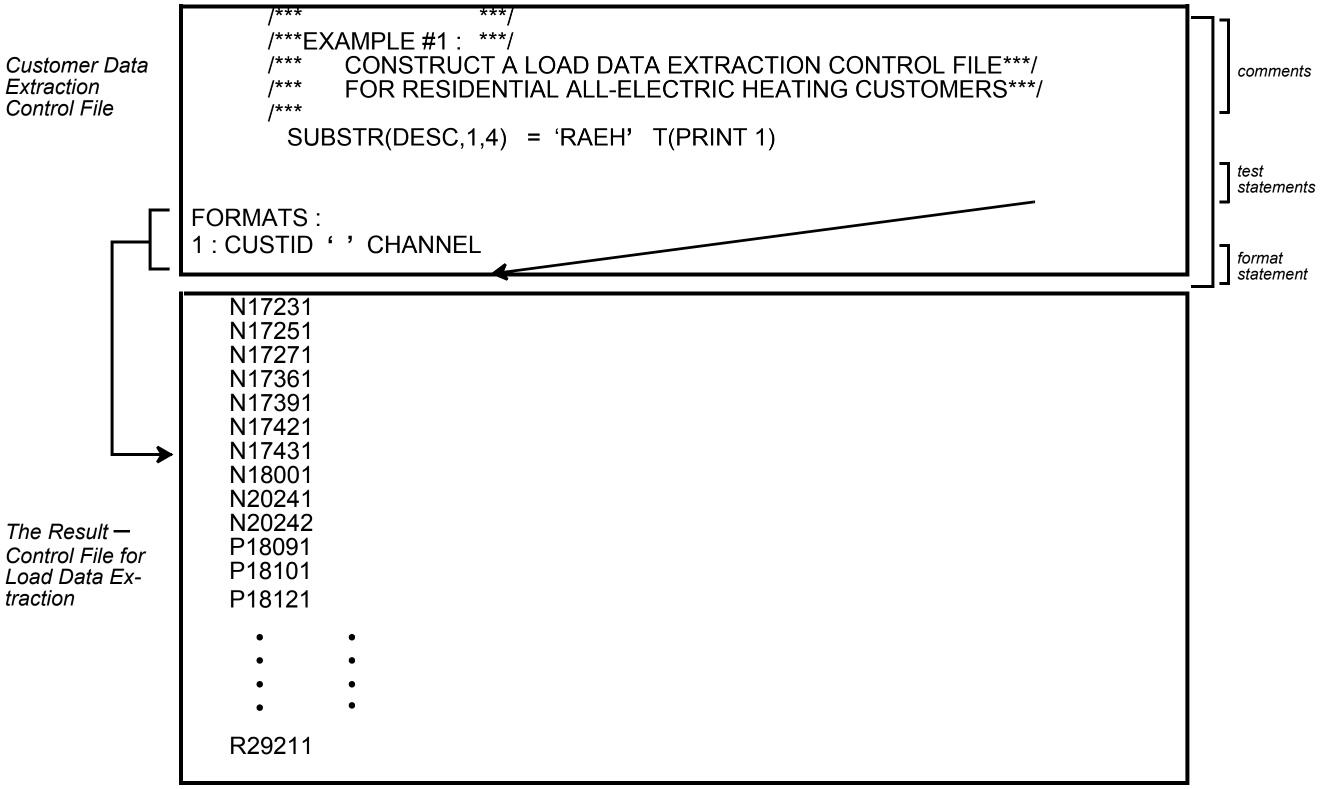
SUBSTR functions can be used in both Test and Format statements to extract character strings from generator variables. See **SUBSTR Functions** on page 14-11 to learn more about SUBSTR functions.

Counters are also important. They are special elements that you can use in different ways throughout the file — for example, to count the number of records with specified characteristics, or to stop processing after a certain number of records have been counted.

Test statements, Format statements, End statements, and counters can be complex, so we will examine each of them more closely in the following sections.

Test Statements

You can input up to 2000 test statements in a single Control File, but only one test statement per line. Each test statement consists of the following elements:



```
/***                    ***/
/***EXAMPLE #1 :  ***/
/***     CONSTRUCT A LOAD DATA EXTRACTION CONTROL FILE***/
/***     FOR RESIDENTIAL ALL-ELECTRIC HEATING CUSTOMERS***/
/***
  SUBSTR(DESC,1,4)  =  'RAEH'   T(PRINT 1)

FORMATS :
1 : CUSTID  ' '  CHANNEL
```

```
N17231
N17251
N17271
N17361
N17391
N17421
N17431
N18001
N20241
N20242
P18091
P18101
P18121
  •      •
  •      •
  •      •
  •      •
R29211
```

Customer Data Extraction Control File
comments
test statements
format statement
The Result — Control File for Load Data Extraction

Figure 13-4 Sample Control File and Its Results

The example shows how PRINT instructions trigger Format statements, which, in turn, dictate the contents and organization of the output.

	Test Clause			Action Clause		
(Format)	Label	Variable	Relation	Test Value	True Statement	False Statement
(Example)	L1 :	SUBSTR(CUSTID,1,3)	=	'B00'	T(L2)	F(NEXT)

The example tells Oracle Utilities Load Analysis to, for each record in the database, look at the first three characters in the customer-id. If it is true that they match B00, then compare that record against the criteria specified by test statement L2. If it is false, skip that record and test the next record in the database or file.

To better understand how you can construct your own test statements, let's look at each generic element of the format:

- **Label** — Identifies the test statement for reference by other statements. (Labels are optional; you need to preface a statement with a label only if it will be the target of other statements.) A label can be any word or code of your own choosing, as long as it is no more than 8 alphanumeric characters long, and the first character is alphabetic. Input a colon (:) after the label, but do **not** insert a blank between the label and the colon. Do insert a blank after the colon and before the test clause. Here are three sample labels:

L1:

LINE:

TSTCHANL:

- **Variable** — The record field being examined. The acceptable variables and their formats for Key Generators are listed in tables in *Appendix K: Key Generator Variable Lists* and summarized in the *Quick Reference Guide.* ***Note:*** *The variables you specify for Key Generators* ***must*** *be one of these fields. Options are slightly different depending upon which database you are working with (CLDB, ALDB, ELDB, or SLDB), so be sure to check the appropriate table for the database.*

  Note: Whenever a test variable is defined as "CHAR" in the variable list (or *Appendix K: Key Generator Variable Lists*) or your Customer Record Definition File (for example, CUSTID = 'A7304'), and your test value for that variable is a text string, you must enclose the test value in apostrophes.

- **Relation** — How the record value should compare to the test-value(s). You can use any of the following relations. "Equal to" is the default.

=	variable equal to test-value
>	greater than
<	less than
# or ^=	not equal to
>=	greater than or equal to
<=	less than or equal to
=*	variable contains test-value anywhere
=?	variable contains test-value starting in a specific column.

- **Test value** — Criteria for the evaluation. It can be a constant or character string that may exist in a database record, or it can be a second variable. For example, consider the following test clauses:

DESC ='NONE'

DESC =CUSTID

The first sample test statement compares a variable to a constant; the second compares a variable to a second variable.

You can include multiple test-values within a single test statement. In such cases, a logical OR is assumed. For example, *all* of the following test clauses mean "Is the variable CUSTID equal to A7304 or B7418 or C7313?".

CUSTID = 'A7304' = 'B7418' = 'C7313'

CUSTID 'A7304' 'B7418' 'C7313'

CUSTID = 'A7304', 'B7418', 'C7313'

If you want a variable to meet multiple conditions, you must put each test value on a separate line. For example, if you wanted all customer records with strata numbers greater than or equal to 2 **and** less than or equal to 4, you could construct the following test statements:

CHANNEL > = 2

CHANNEL < = 4

If a test value contains embedded blanks or commas, you must enclose it in single quotes.

Before we go on, let’s look at a few more sample test clauses and their meanings (test clauses are a subset of the test statement and consist of a variable, relation, and one or more test values).

CHANNEL # 1	*Is the variable* CHANNEL *not equal to 1?*
DESC = ‘RAEH’, ‘RHWH’	*Is the variable* DESC *equal to the constant RAEH or RHWH?*
DESC = CUSTID, ‘TEMP05’	*Is the variable* DESC *equal to the variable CUSTID or the constant TEMP05?*

- **Wild cards** — A “wild card” feature allows you to find particular characters within a variable. The “=*” operator enables you to find the test value anywhere in the variable. For example, the following test clause means “Does the variable CUSTID Contain AGG?”:

  CUSTID =*   AGG

  Another option, the “=?” operator, allows you to find the test value starting in a specific column. To use this positional wildcard operator, the test value is specified with placeholders (“?”) preceding the starting column. For example, the following test clause means “Does the variable CUSTID contain AGG starting in column 4?”:

  CUSTID =?   ???AGG

  The wildcard feature can only be used on database variables that are defined as character. See the variable lists in *Appendix K: Key Generator Variable Lists*.

- **True and False clauses** — True clauses specify the action the program will take if a record matches the criteria. False clauses specify the action the program will take if a record does not match the criteria. Possible actions are:

  Output one or more fields from the record (PRINT)

  Count occurrence (COUNT)

  Continue with the next test (continue)

  Restart the test with the next record (NEXT)

  Branch forward to another test statement (label)

  Terminate the program (STOP)

  A combination of the above.

Here is a summary of the format you will use for constructing the clauses.

> **Note:** True clauses must be preceded by the prefix “T” and false clauses by “F”. Parentheses must enclose the clauses. Do not insert a blank between the prefix and the left parenthesis.

True Clause:

T ([**PRINT** *n*] [,**COUNT** *m*] [,*label* | ,**STOP** | ,**NEXT** | , continue])

False Clause:

F ([**PRINT** *n*] [,**COUNT** *m*] [,*label* | ,**STOP** | ,**NEXT**])

PRINT n tells Oracle Utilities Load Analysis to write data from the record to a file or report, using the format you specify in Format Statement “n”. (Input the word “PRINT” followed by a blank and the Format Statement number “n”.)

COUNTm tells Oracle Utilities Load Analysis to count the number of occurrences of the condition you specified in the test statement. You can have multiple counters in a Control File; use an integer “m” to distinguish between them. (Input the word “COUNT” followed by an integer “m”.) ***Note:*** For a more complete description of what you can do with COUNTm, see **Counter**

Variables on page 14-12. “m” can be a value between 1 and 999.

NEXT tells Oracle Utilities Load Analysis to stop evaluating the current record and compare the next record with the first test statement. This action is the default for all false clauses, and for the last true clause in the file. (For true clauses, input the word “NEXT”; for false clauses, no input is required.)

label tells Oracle Utilities Load Analysis to compare the current record with the test statement prefixed by “label”. (Input your designation for the label. ***Note:*** The labelled statement must occur below the clause; in other words, only “forward” branches are allowed.)

STOP tells Oracle Utilities Load Analysis to stop the program whenever the condition specified has been met. STOP is useful when searching for one particular record; there is no need to scan the remaining records after finding the desired record. (Input the word “STOP”.)

continue tells Oracle Utilities Load Analysis to compare the current record with the next test statement. This action is possible only for true clauses, and is the default for all true clauses except the last one in the file. (Because it is the default, no entry is required. Do not input the word “continue”.) To continue when a false clause is executed, you must put in the label of the next statement.

You can include the “COUNTm” and “PRINT n” clauses with any one of the other four clauses in the same statement. However, the “continue”, “STOP”, “NEXT”, and “LABEL” clauses are mutually exclusive.

Logically, each test statement must have one true clause and one false clause. However, in many cases you will not need to actually input both, because you can often rely on the defaults.

Oracle Utilities Load Analysis will compare each record against the entire set of test statements until it reaches a STOP Statement or the end of the database. It will then output the results according to the instructions you provide in the Format statements.

Some Tips on Constructing Test Statements

Before going on to the Format statements, let’s look at a few sample test statements. These samples show that there can be many ways of setting up the test statements to accomplish the same task, but you must be careful to structure the statements to get the result you really want. In addition, some approaches are more direct and therefore easier to understand. As a general rule, it is best to construct the file with the fewest possible statements, and to set the clauses to match desired conditions.

In the following examples, our task is to direct the program to print data from all records that have strata numbers 2 through 10. The first two statements will yield the proper results; the third will not.

Sample 1

```
CHANNEL >= 2
CHANNEL <= 10     T(PRINT 1)
```

The first test statement asks, “Is the CHANNEL greater than or equal to 2?”. Because we have not supplied any action clauses, Oracle Utilities Load Analysis will assume the defaults. If true, it will compare the current record to the next test statement. If false, it will skip to the next record. The second test statement asks, “Is the CHANNEL less than or equal to 10?”. If true, Oracle Utilities Load Analysis will output data according to Format Statement 1. If false, it will skip to the next record. This is a logical and efficient approach.

Sample 2

```
         CHANNEL < 2 T(NEXT), F(TRYAGAIN)
TRYAGAIN:CHANNEL > 10  T(NEXT), F(PRINT 1)
```

The first test statement asks, “Is the CHANNEL less than or equal to 2?”. If yes, the program will skip the current record and continue testing with the next record. If false, it will branch to the test statement labelled “TRYAGAIN”. The “TRYAGAIN” statement asks, “Is the CHANNEL greater than or equal to 10?”. If yes, Oracle Utilities Load Analysis will skip the record, but if not, it will output data according to Format Statement 1.

While this approach will yield the desired result, it is not as direct and efficient as Sample 1.

Sample 3 (incorrect)

```
CHANNEL >= 2, <= 10 T(PRINT 1)
```

Format Statements

You use Format statements to specify the layout of the output file or report. You can tell the program to print variables from the database or file records, add titles or notes, and insert blank lines or spaces to make the output more readable. Remember, Oracle Utilities Load Analysis executes a Format Statement only when directed by the 'PRINT n' option of a true or false clause. (The exception is END statements, which are explained at the end of this section.)

Let's consider an example:

CHANNEL = 2, 3, 4 T(PRINT 1)

FORMATS:

1: 'CUSTOMER IS' CUSTID 'AND CHANNEL IS ' CHANNEL SKIP(1)

For each customer whose strata number is 2, 3, or 4, Oracle Utilities Load Analysis will output a line in the report or file using the specified format. For example, for customer B003 who is in stratum 3, Oracle Utilities Load Analysis will output the following line, preceded by a blank line:

CUSTOMER IS B003 AND CHANNEL IS 3

You can have up to 99 Format statements in a single Control File, and each one can continue over more than one line. Within the file, you must put the Format statements *after all* of the test statements (you cannot intermingle the two types). You must input the Keyword "FORMATS:" between the test statements and the Format statements.

Each Format Statement has the general form shown below. You can input the parameters in any order in the output line, except "n" must begin each line and field spec (if used) must come after the variable it refers to.

n: {[*variable*[*field spec]]* [*literal*] [**BLANK**(*n*)] [**PAGE**] [**SKIP**(*n*)] }

- **n:** — identifies the Format Statement for reference by test statements. It can be any integer from 1 to 99; you need not enter them consecutively. The integer "n" must be followed by a colon (:). Do not put blanks between "n" and the colon.
- **variable** — identifies a variable in the record, which you want written to the output report or file. For Customer Data Extraction, you can specify any variable name used in the Customer Attribute File (as defined in your Customer Record Definition File). For Key Generators, you can use any name from the variable list in the *Quick Reference Guide*. You can have any number of variables in a Format Statement.
- **field-spec** — is optional and indicates the total length of the output field and the number of decimal digits for printing numbers. For example, if you want to specify a field width of seven characters including two decimal digits, you would input "7.2".
- If you specify a number of spaces less than the length of the variable, Oracle Utilities Load Analysis will output only the number of characters you specified.
- **literal** — an optional character string, not exceeding 20 characters. Use it to input titles or notes, or to insert spaces between variables in the report or file. You **must** enclose your entry in single quotation marks. If your character string includes single quotation marks, they must be replaced with the escape character "&QUOT;".
- **BLANK(s)** — use to specify that "**s**" blank spaces be inserted in the output line. You can specify from 1 to 132 spaces. You must enclose the number in parentheses.
- **PAGE** — use to force a page eject before the output line.
- **SKIP(l)** — use to specify "**l**" blank lines before the output line. You must enclose the number in parentheses.

END: {[*variable*[*field spec*]] [*literal*] [**BLANK**(*n*)] [**PAGE**] [**SKIP**(*n*)] }

- **END Statement** — The END Statement is a special type of optional Format Statement that is not tied to a PRINT instruction in the test statements. All other Format statements are executed while the CAF is being processed and PRINT actions are encountered. The END Statement is only executed when a STOP action occurs or the end of the DATABASE is reached. It is normally used to print out summary information and counter values. An example of an END Statement is:

  END: 'NUMBER OF COMMERCIAL' ' APARTMENT BUILDINGS' ' IS ' COUNT1

  END statements use the same format as regular Format statements, except you input the keyword "END" instead of a variable "n".

  Important Note: The keyword "END" must be used as a component of a Format Statement. It is not used to indicate the end of a file. This will cause the program to abort.

SUBSTR Functions

The SUBSTSR function extracts a section of characters from a specified variable. This function can be applied to character variables in both test statements and format statements. The SUBSTR function has the following format:

`SUBSTR(variable, start-position, length)`

variable: The Key Generator variable on which to operate. The variable must be a character datatype.

start-position: The location in the variable where the function begins extracting characters. The first character of the variable has a start-position of 1.

length: The desired number of characters to extract. Specify "*" to extract to the end of the variable.

The following table shows the results of several SUBSTR functions applied to a DESC variable with the value "250 BROADWAY LANGLEY NC 07034":

Function	Result
SUBSTR(DESC, 1, 3)	"250"
SUBSTR(DESC, 14, *)	"LANGLEY NC 07034"

Control File Examples:

Test Statement: L1: SUBSTR(CUSTID,1,1) = 'N' T(PRINT 1) F(NEXT)

Format Statement: 1: SUBSTR(CUSTID,1,10) ',' SUBSTR(DESC,1,10)

Counter Variables

Counter variables enable you to keep a running count of the occurrence of specified conditions as the program applies your test statements to the records. They can be used in several different ways to accomplish different tasks:

- *As the specified action in true/false clauses* — to count the number of records matching or not matching your criteria.
- *As the variable in test clauses* — to initiate other actions when a certain count has been reached.
- *As a variable in Format statements* — to output the number counted. Counter variables are treated as integer variables with a default field width of 8.

The following two examples illustrate the three different applications:

Sample 1

counter is part of action clause

```
DESC = ‘COFC’ T(COUNT1)
COUNT1 > 70 T(STOP), F(PRINT 1)
```

counter is variable in test clause

These two test statements will cause data for the first 70 COFC (Commercial Office Building) customers to be printed out.

Sample 2

```
DESC = ‘COFC’ T(COUNT1), F(COUNT2)
FORMATS:
END: ‘NUMBER OF COMMERCIAL’ ‘ OFFICE BUILDING CUSTOMERS’ ‘ IS ’ COUNT1
‘NUMBER OF OTHER CUSTOMERS IS ’ COUNT2
```

counter is variable in Format Statement

The number of each type of customer will appear at the end of the report.

Remember, the format of counters is “COUNTm”, with the integer “m” used to distinguish the different counters. You can have up to 999 counters in a Control File.

A Checklist for Using the Control Language

Here is a summary of the rules you must follow when using the Control Language to construct your CDE or Key Generator Control files.

General

Test statements must precede Format statements. Comments can be placed anywhere in the file. To improve its appearance and readability, you may put blank lines anywhere in the file.

Comments

You must enclose your comments in these symbols: /* and */. Do not split comments across lines (unless you begin and end each line with the slash/asterisk symbols). Do not enter the slash/asterisk symbols in columns 1 or 2.

Test statements

You can have up to 2000 test statements in a single Control File, but only one test statement per line. Except where noted below, you can use blanks or commas to separate the elements of a statement to improve its appearance and readability.

Labels — can be up to 8 alphanumeric characters long, but the first character **must** be alphabetic. Each label must be followed by a colon; do not put blanks between the label and the colon.

Variables — **must** be one of the acceptable variables from the Key Generator list in the *Quick Reference Guide* (for Key Generators); or a variable from your utility's Customer Attribute File (for Customer Data Extraction).

Relation — must be one of the accepted symbols: =, >, <, #, ^=, =, >=, <=, =*, =?.

Test-values — If a test-value contains embedded blanks or commas, you must enclose it in single quotes. Also, remember that if you specify multiple test-values, Oracle Utilities Load Analysis assumes that you will accept any **one** of them. If the positioned wildcard operator (=?) is used, the test-value should be specified with placeholders (?) preceding the starting column.

True and false clauses — You must precede each true clause with a "T" and each false clause with an "F", and enclose each clause in parentheses. Do not put a blank between the prefix and the left parenthesis.

Each test statement must have one true and one false clause. If you do not enter them, Oracle Utilities Load Analysis will assume the default ("continue" for true clauses and "NEXT" for false clauses and the last true clause in the file).

Format statements

You can input up to 99 Format statements in a single Control File, and a single statement can take up more than one line.

The keyword "FORMATS:" must precede the Format statements.

All Format statements, except END statements, must be referenced by a PRINT instruction in the test statements.

Literals (optional character strings for notes or titles) must be enclosed in single quote marks.

Use the BLANK option, or literals, to separate output fields so that they do not run together in the output file.

Sample Control Files for Key Generators

To further illustrate how you can apply the Control Language we just described, here are some sample Control files.

Example #1 — CLDB Key Generator Control File

Example 3 shows a Control File that generates edit blocks for customer-ids starting with R2921 and N2024. The record type test (RECTYPE = ‘ ’) selects active records of these cuts. For channel 1 of customer-ids starting with R2921, an edit block is written consisting of a KEY Command and two Correction commands, “SET METER-MULT 4.02” and “SET MERGE YES”. For channel 1 of customer-ids starting with N2024, edit blocks containing a KEY Command and a “SET ARCHIVE YES” Correction Command are generated. All other customer-ids starting with N2024 have edit blocks that contain commands to set their merge flag to “YES”. Output from this example is shown in the lower box.

```
        RECTYPE = ‘ ’
        CUSTID = ‘R2921’       F(CHECK2)
        CHANNEL = 1        T(PRINT 1)
CHECK2: CUSTID = ‘N2024’
        CHANNEL = 1           T(PRINT 2), F(PRINT 3)

FORMATS:
1:    ‘KEY ’ CUSTID ‘ ’  CHANNEL ‘  ’START SKIP(1)
‘  ’  ‘SET METER-MULT 4.02’   SKIP(1)
‘  ’  ‘SET MERGE YES’        SKIP(2)
2:    ‘KEY ’ CUSTID  ‘  ’  CHANNEL ‘  ’START SKIP(1)
‘  ’  ‘SET ARCHIVE YES’      SKIP(2)
3:    ‘KEY ’ CUSTID  ‘  ’  CHANNEL ‘  ’START SKIP(1)
‘  ’  ‘SET MERGE YES’         SKIP(2)
```

Control File

```
KEY N2024      1      05/14/97–09:55:00
      SET ARCHIVE YES

KEY N2024      1      06/14/97–14:27:00
      SET ARCHIVE YES

KEY N2024      2      05/14/97–09:55:00
      SET MERGE YES

KEY N2024      2      06/14/97–14:27:00
      SET MERGE YES

KEY R2921      1      04/12/97–10:10:00
      SET METER_MULT 4.02
      SET MERGE YES

KEY R2921      1      05/10/97–10:27:00
      SET METER_MULT 4.02
      SET MERGE YES

KEY R2921      1      06/09/97–23:15:00
      SET METER_MULT 4.02
      SET MERGE YES
```

Output File

Example #2 — CLDB Key Generator Control File

Example 4 shows a Control File that generates full keys from cuts within the month of March 1999 for customer-ids beginning with the letter ‘B’.

```
L1:   RECTYPE = ‘ ’T(L2)F(STOP)
L2:   CUSTID = ‘B’T(L3)F(NEXT)
L3:   STARTDAT >= 03/01/99T(L4)F(NEXT)
L4:   STARTDAT <= 03/31/99T(PRINT 1)F(NEXT)

FORMATS:
1:    CUSTID ‘ ’  CHANNEL ‘  ’START
```

Example #3 — CLDB Key Generator Control File

Example 5 shows a Control File that generates full keys of invalid cuts starting after the date 01/01/99. Because the last cut of a cut series is always marked as externally invalid, it will be excluded from this report *unless* it is *internally* invalid.

```
RECTYPE = ‘ ’  T(L1)   F(STOP)
/* IF INTERNALLY VALID THEN GOTO L2.*/
/* ELSE PRINT IF AFTER 01/01/99 AND*/
/* START TESTING WITH NEXT RECORD*/
L1: INTVALID = NOT(L14,NEXT)F(L2)
/* IF EXTERNALLY INVALID THEN GOTO L3.*/
/* ELSE START TESTING WITH THE NEXT RECORD*/
L2:   EXTVALID = YEST(NEXT)   F(L3)
L3:   MSG1 = ‘  ’T(NEXT)      F(L4)
L4:   MSG1 > ‘(E’T(L14)       F(L5)
L5:   MSG2 > ‘(E’T(L14)       F(L6)
L6:   MSG3 > ‘(E’T(L14)       F(L7)
L7:   MSG4 > ‘(E’T(L14)       F(L8)
L8:   MSG5 > ‘(E’T(L14)F(L9)
L9:   MSG6 > ‘(E’T(L14)F(L10)
L10:  MSG7 > ‘(E’T(L14)F(L11)
L11:  MSG8 > ‘(E’T(L14)F(L12)
L12:  MSG9 > ‘(E’T(L14)F(L13)
L13:  MSG10 > ‘(E’T(L14)F(NEXT)
L14:  STARTDAT > 01/01/99 T(PRINT 1, NEXT) F(NEXT)
FORMATS: /** FORMAT STMTS GO BELOW TEST STMTS. **/
1:    CUSTID ‘  ’ CHANNEL ‘  ’ START
```

Example #4 — CLDB Key Generator Control File

Example 6 shows a Control File that generates edit blocks for all invalid cuts. Because the last cut of a series is always externally invalid, it isn’t included in the report.

```
RECTYPE = ‘ ’  T(L1)   F(STOP)
/* IF INTERNALLY VALID THEN GOTO L2. ELSE PRINT AND*/
/* START TESTING WITH NEXT RECORD*/
L1: INTVALID = NOT(PRINT 1, NEXT) F(L2)
/* IF EXTERNALLY INVALID THEN GOTO L3. ELSE START*/
/* TESTING WITH THE NEXT RECORD*/
L2:   EXTVALID = YEST(NEXT)F(L3)
L3:   MSG1 = ‘  ’T(NEXT)F(L4)
L4:   MSG1 > ‘(E’T(L14)F(L5)
L5:   MSG2 > ‘(E’T(L14)F(L6)
L6:   MSG3 > ‘(E’T(L14)F(L7)
L7:   MSG4 > ‘(E’T(L14)F(L8)
L8:   MSG5 > ‘(E’T(L14)F(L9)
L9:   MSG6 > ‘(E’T(L14)F(L10)
L10:  MSG7 > ‘(E’T(L14)F(L11)
L11:  MSG8 > ‘(E’T(L14)F(L12)
L12:  MSG9 > ‘(E’T(L14)F(L13)
L13:  MSG10 > ‘(E’T(PRINT 1, NEXT)F(NEXT)
L14:  STARTDAT > 01/01/99 T(PRINT 1, NEXT) F(NEXT)
FORMATS: /** FORMAT STMTS GO BELOW TEST STMTS.          **/
1:    ‘KEY’ CUSTID ‘  ’ CHANNEL ‘  ’ START
```

Example #5 — ALDB Key Generator Control File

Example 7 shows a Control File that generates full keys of all cuts with customer-ids starting with “ACC2” that start in the month of February 1999.

```
/*** GENERATE KEY LIST FOR CUSTOMERS BEGINNING WITH A**/
/*** FOUR LETTER PREFIX AND WITHIN A GIVEN DATE RANGE**/

RECTYPE = ‘ ’  T(L1)   F(NEXT)
l1: SUBSTR(CUSTID,1,4) = ‘ACC2’T(L2)F(NEXT)
L2: STARTDAT >= 02/01/99T(L3)
L3: STARTDAT <= 02/28/99T(PRINT 1)F(NEXT)
FORMATS: /** FORMAT STMTS GO BELOW TEST STMTS.       **/
1:    CUSTID ‘  ’ CHANNEL ‘  ’ START
```

Example #6 — ALDB Key Generator Control File

Example 8 shows a Control File that generates full keys for all cuts whose start-times fall on or after January 1, 1999. This Key File is to be used in a run to segment the ALDB into parts. The outputs from this example are displayed below.

```
RECTYPE = ‘ ’  F(NEXT)
START >= 01/01/99–00:00:00T(PRINT 1)

FORMATS:
1:    CUSTID ‘   ’ CHANNEL ‘   ’ START
```

```
N1723          1      01/12/99–10:12:00
N1723          1      02/11/99–12:23:00
N1723          1      03/16/99–11:35:00
N1723          1      04/12/99–13:51:00
N1725          1      01/07/99–13:03:00
N1725          1      02/09/99–12:25:00
N1725          1      03/15/99–13:09:00
N1725          1      04/12/99–11:10:00
N1727          1      01/08/99–15:10:00
N1727          1      02/11/99–11:57:00
N1727          1      03/16/99–11:03:00
N1727          1      04/12/99–12:40:00
N1736          1      01/08/99–13:48:00
N1736          1      02/11/99–10:56:00
N1736          1      03/16/99–10:03:00
N1736          1      04/13/99–09:49:00
N1739          1      01/08/99–12:55:00
N1739          1      02/10/99–10:50:00
N1739          1      03/15/99–14:42:00
N1739          1      04/13/99–11:04:00
N1742          1      01/08/99–11:58:00
N1742          1      02/10/99–11:19:00
N1742          1      03/15/99–14:55:00
N1742          1      04/13/99–11:18:00
N1743          1      01/08/99–12:33:00
N1743          1      02/09/99–12:21:00
N1743          1      03/15/99–14:25:00
N1743          1      04/13/99–10:36:00
N2024          1      01/07/99–08:52:00
N2024          1      02/09/99–10:50:00
N2024          1      03/15/99–12:18:00
N2024          1      04/12/99–10:59:00
N2024          2      01/07/99–06:52:00
N2024          2      02/09/99–10:50:00
N2024          2      03/15/99–12:18:00
N2024          2      04/12/99–10:59:00
P1809          1      01/14/99–13:31:00
P1809          1      02/17/99–13:58:00
P1809          1      03/19/99–12:46:00
P1809          1      04/19/99–11:59:00
P1810          1      01/14/99–13:45:00
P1810          1      02/17/99–13:54:00
P1810          1      03/19/99–12:15:00
P1810          1      04/19/99–11:53:00
P1812          1      01/16/99–09:59:00
P1812          1      02/17/99–11:00:00
P1812          1      03/19/99–12:59:00
P1812          1      04/19/99–10:12:00
P1813          1      01/15/99–13:23:00
P1813          1      02/17/99–13:35:00
P1813          1      03/19/99–11:45:00
P1813          1      04/19/99–09:52:00
P1815          1      01/07/99–10:00:00
P1815          1      02/10/99–09:59:00
```

Example #7 — ELDB Key Generator Control File

Example 9 shows a Control File that generates keys for all ELDB statistical records for average Sunday statistics from database keys starting with “ACC1—SUN”.

```
/*** GENERATE KEY LIST FOR ALL ELDB CUTS**/
/*** WHICH ARE RELATED TO AVERAGE SUNDAY STATISTICS**/

      RECTYPE = ‘  ’ F(STOP)
L1: SUBSTR(CUSTID,1,8) = ‘ACC1–SUN’T(PRINT1) F(NEXT)

FORMATS: /** FORMAT STMTS GO BELOW TEST STMTS.      **/
1:    CUSTID ‘  ’ CHANNEL ‘  ’ START
```

Example #8 — ELDB Key Generator Control File

Example 10 shows a Control File that generates full keys of all cuts with database keys starting with “ACC2” that start in the month of February, 1999.

```
/*** GENERATE KEY LIST FOR CUSTOMERS BEGINNING WITH A**/
/*** FOUR LETTER PREFIX AND WITHIN A GIVEN DATE RANGE**/

      RECTYPE = ‘  ’ T(L1)F(STOP)
L1: SUBSTR(CUSTID,1,4) = ‘ACC2’T(L2)F(NEXT)
L2: STARTDAT >= 02/01/99T(L3)F(NEXT)
L3: STARTDAT <= 02/28/99T(PRINT1)F(NEXT)

FORMATS: /** FORMAT STMTS GO BELOW TEST STMTS.      **/
1:    CUSTID ‘  ’ CHANNEL ‘  ’ START
```

Example #9 — SLDB Key Generator Control File

Example 11 shows a Control File that generates keys for all SLDB statistical records for average Tuesday statistics from database keys starting with “RWH1—TUE”.

```
/*** GENERATE KEY LIST FOR ALL SLDB CUTS**/
/*** THAT ARE RELATED TO AVERAGE TUESDAY STATISTICS**/

      RECTYPE = ‘  ’ T(L1)F(NEXT)
L1: SUBSTR(CUSTID,1,8) = ‘RWH1–TUE’T(PRINT 1) F(NEXT)

FORMATS: /** FORMAT STMTS GO BELOW TEST STMTS.          **/
1:    CUSTID ‘  ’ CHANNEL ‘  ’ START
```

Example #10 — SLDB Key Generator Control File

Example 12 shows a Control File that generates full keys of all cuts with database keys starting with “COML” that fall between June 1 and June 28, 1999.

```
/*** GENERATE KEY LIST FOR CUSTOMERS BEGINNING WITH A**/
/*** FOUR LETTER PREFIX AND WITHIN A GIVEN DATE RANGE**/

      RECTYPE = ‘  ’ T(L1)F(NEXT)
L1: SUBSTR(CUSTID,1,4) = ‘COML’T(L2)F(NEXT)
L2: STARTDAT >= 06/01/99T(L3)F(NEXT)
L3: STARTDAT <= 06/28/99T(PRINT 1)F(NEXT)

FORMATS: /** FORMAT STMTS GO BELOW TEST STMTS.          **/
1:    CUSTID ‘  ’ CHANNEL ‘  ’ START
```

Using the Key Generator Programs

Now that you know how to use the Control Language, let’s run through the steps for actually producing a file or report using the Key Generators. The following describes use of the Key Generators for the ALDB, CLDB, ELDB, and SLDB.

Summary — Using a Key Generator Program

1. Create the Key Generator Control File (TGX81A.CTL, TGX82A.CTL, TGY81A.CTL, TGY82A.CTL).
2. Run the appropriate Key Generator Program.
3. Check output.

Step 1: Create the Key Generator Control File (TGX81A.CTL, TGX82A.CTL, TGY81A.CTL, TGY82A.CTL)

Use the Key Generator Control Language to specify your criteria for the output list or report.

Note: The output of the Key Generator can be named to something other than the TGX811.CTL defaulted keys file and a path can be used in the name. Also it is a very good idea to run through the logic of your Control File using a paper and pencil before submitting the job to the computer.

In addition, the control file composer for the Key Generator will allow mixed-case to support XML.

Step 2: Add the (optional) Environment File

You can create the Environment File using the POSition, PRInt, and CENtury commands:

TRAILS

PRInt [**ECOnomize** | **FULl**]

CENtury [**Yes** | **No**]

TRAILS (*Optional*) This command directs the program to search information located within the Edit trails of edited cuts. Using this command and running the program in this mode may affect performance as the program must retrieve twice the number of records from the database as compared to active cut records.

Once this command is in effect, there are a number of variables that the user may use as test variables in the control file and are all of TEXT or CHAR type. These include:

- TRAILS: This test variable will define all 150 available TRAILs in a single string
- TRAILCT: This variable will define the number of edit trails associated with a cut.
- TRAIL1, TRAIL2.. TRAILn… TRAIL40: These variables will define specific edit trails up to the 40th edit trail.

  The maximum number of edit trails that may be searched is the first 40.

If TRAILS is in effect, the only other cut characteristics that may be included as test or print statements (available variables) are all CUSTID variables, channel, and all parts of the start time.

The TRAIL parameter may appear in the Environment File as TRAIL or TRA.

PRInt - (Optional) This command will instruct the program to write or not write format statement data into the output report (REPORT.HTML). Print Full is the default.

> **FULl** - Instruct the program to write into the output report the format data records satisfying the search criteria in the Control File.
>
> **ECOnomize** - Instruct the program *not* to write into the output report the format data records satisfying the search criteria in the Control File, resulting in a smaller report.

CENtury - If this command is specified, either with the Yes option or with none, all dates written by the Key Generator will contain a 4-digit year (e.g. 1999). If the command is absent or the No option is specified, the date will contain a 2-digit year (e.g. 99).

Step 3: Run the Key Generator Program

Use the appropriate program, according to the database you are working with.

ALDB:(X820)
CLDB:(X810)
ELDB:(Y810)
SLDB:(Y820)

Key Generator Processing

The Key Generator Program starts testing each customer record with the first test statement in the Control File. For each test statement, the value of the specified customer variable is compared to each test value in the value-list in succession. If the comparison between the customer variable and a test value matches the relation specified for that test value, the test statement is set to "TRUE" and no more test values are tried. If the value list is exhausted and no matching relationship has been found, the test statement is set to "FALSE".

After the test statement is set to "TRUE" or "FALSE", the action specified by the statement's true- or false-clause is taken. Test statements continue to be executed for the customer record until an execution true- or false-clause specifies "NEXT" or all the test statements have been performed.

The next cut is then read, and the program restarts testing from the top of the Control File. The program continues in this manner until all customer records have been read or a "STOP" condition is reached. If a test-clause is not specified for a test statement, the statement is automatically set to "TRUE" and the true-clause is executed.

Step 4: Check Output

At the end of its run, the Key Generator Program produces two outputs:

- **Output Keys File** — lists the cut keys that match user-defined criteria. By default the programs output this file to the Job directory, but you can specify the location of this file on the Submit Panel.
- **Execution Log** — lists back the Key Generator Control File and identifies any errors; includes the Extracted Data Report that lists the contents of the Output Keys File.

As with other output reports, be sure to go over each one carefully to ensure that there were no problems and the program executed successfully.

Samples of the reports follow.

Chapter 15

Performing Ad Hoc Load Calculations Using the Transformation Program (X620, Y620)

In an earlier chapter, we saw how it is possible to use the Load Data Editor to modify cuts by specifying new values to replace old ones. The Transformation Program also enables you to modify cuts or create new ones, but the operations it performs are more complex. Specifically, you can perform arithmetic operations on the data or apply any of a set of "Transformation Functions" such as sorting, masking, or rescaling.

Topics covered are:

- **What Does the Transformation Program Do?**
- **Using the Transformation Commands**
- **Steps for Using the Transformation Program**

What Does the Transformation Program Do?

The Transformation Program is a useful "tool kit" of commands that enable you to calculate new data from existing data in the Interval Database. For example, you can quickly apply loss factors, compute KVA, or combine multiple channels of data into a single record. The program also allows you to manipulate existing data; for instance, you can select data by TOU period or prepare cuts for graphing.

The types of transformations you can perform fall into two categories:

- **Arithmetic operations** — you can add, subtract, multiply, or divide cut data by other cut data or by a supplied constant. This is useful for combining channels of data or applying loss factors.
- **Transformation functions** — you can apply any of a series of Transformation functions to a cut. There are a variety of functions for different tasks — such as sorting, masking, and rescaling data (the complete list is shown in Figure 14-4: Table of Transformation Functions). These functions are very useful if you need to graph a demand duration curve, expand sample statistics to the class level, or disaggregate electric usage into time-of-use periods.

Using the Transformation Commands

As with other Oracle Utilities Load Analysis programs, you will need to create an Environment File and a Control File for input. Since the Control File Commands can seem somewhat complex at first, we will examine their structure and application in detail before looking at the other aspects of the program.

Figure 14-1: Sample Transformation Control File is a sample Control File, which we will refer to from time to time.

Note: The Y620 program supports pre-process key generator. See **Using the Preprocess Key Generator in a Control File** on page 4-4 for more information.

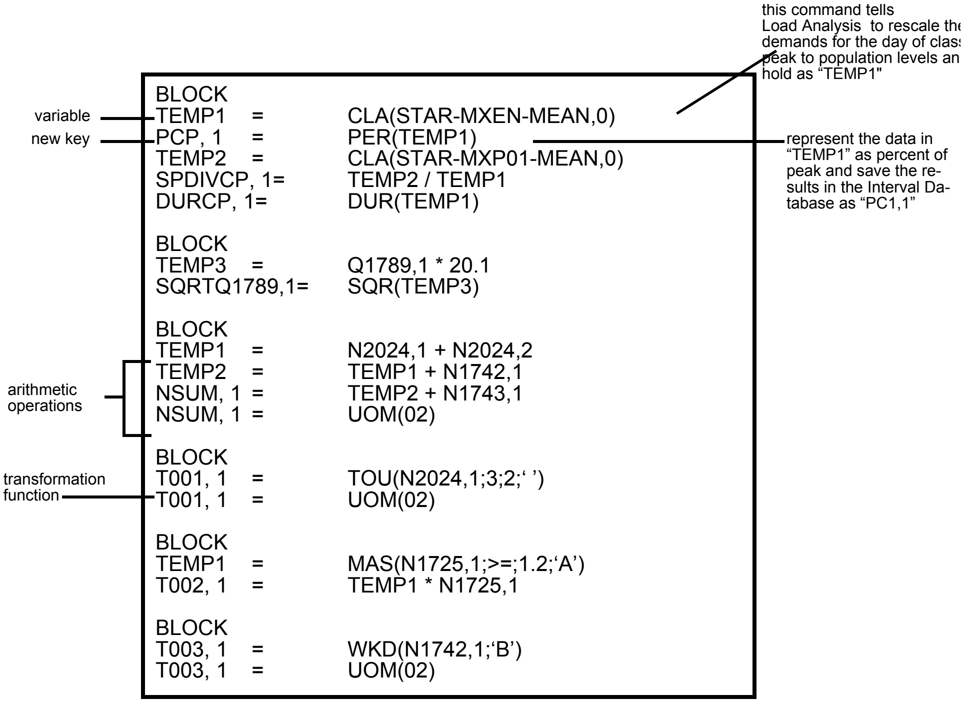
Constructing Blocks

You will construct the Control File using blocks of commands. Each block must be preceded by the keyword "BLOCK" (although you need enter only the first 3 letters — "BLO"). You can have any number of blocks in a Control File. Each block represents one complete transformation operation.

Our sample Control File has six blocks of commands.

Using Variables

"Variables" are an important feature of the Transformation commands. They enable you to save the results of calculations for input to other calculations further down in the logic. They are simply temporary names that you assign to intermediate results of a transformation operation (Figure 14-2: Variables). They work something like the memory key on a calculator.



```
BLOCK
TEMP1    =      CLA(STAR-MXEN-MEAN,0)
PCP, 1   =      PER(TEMP1)
TEMP2    =      CLA(STAR-MXP01-MEAN,0)
SPDIVCP, 1=     TEMP2 / TEMP1
DURCP, 1=       DUR(TEMP1)

BLOCK
TEMP3    =      Q1789,1 * 20.1
SQRTQ1789,1=    SQR(TEMP3)

BLOCK
TEMP1    =      N2024,1 + N2024,2
TEMP2    =      TEMP1 + N1742,1
NSUM, 1  =      TEMP2 + N1743,1
NSUM, 1  =      UOM(02)

BLOCK
T001, 1  =      TOU(N2024,1;3;2;' ')
T001, 1  =      UOM(02)

BLOCK
TEMP1    =      MAS(N1725,1;>=;1.2;'A')
T002, 1  =      TEMP1 * N1725,1

BLOCK
T003, 1  =      WKD(N1742,1;'B')
T003, 1  =      UOM(02)
```

this command tells
Load Analysis to rescale th
demands for the day of clas
peak to population levels an
hold as "TEMP1"
variable
new key
represent the data in "TEMP1" as percent of peak and save the results in the Interval Database as "PC1,1"
arithmetic operations
transformation function

Figure 14-1 Sample Transformation Control File

A variable can have from 1 to 64 alphanumeric characters; e.g., "TEMP1".

> **Note:** You can have up to 100,000 unique variables in a Control File Block. However, all transformation commands that share one or more temporary variables must be contained in the same block. Variables are also the best way to save intermediate values leading to a final result.

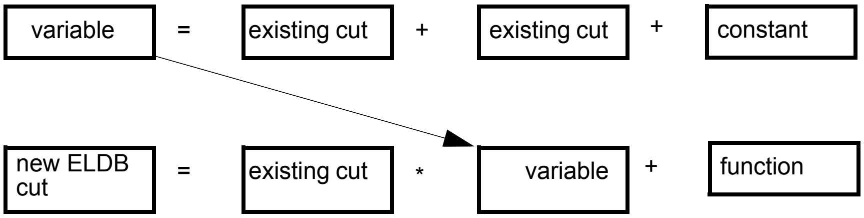


Figure 14-2 Variables

Variables are temporary names that you assign to intermediate results, saving them for use in other calculations. **Note:** In Transformation commands, the results are identified on the left side of the equal sign.

One Type of Transformation Command — Arithmetic Operations

You can construct Transformation commands to create new data using arithmetic operations. Specifically, you can create a new cut or a temporary cut by adding, subtracting, multiplying, or dividing existing cut data, temporary cut data, or a constant by existing cut data, temporary cut data, or a constant. You can also exponentiate an existing key or variable by a positive constant.

For adding, subtracting, multiplying, and dividing:

$$\left\{\begin{matrix}\text{new key to be written}\\ \text{variable (temporary key)}\end{matrix}\right\} = \left\{\begin{matrix}\text{existing key [,start]}\\ \text{variable}\\ \text{constant}\end{matrix}\right\} \begin{matrix}+\\ -\\ *\\ /\end{matrix} \left\{\begin{matrix}\text{existing key, [,start]}\\ \text{variable}\\ \text{constant}\end{matrix}\right\}$$

For exponentiation:

$$\left\{\begin{matrix}\text{new key to be written}\\ \text{variable (temporary key)}\end{matrix}\right\} = \left\{\begin{matrix}\text{existing key [,start]}\\ \text{variable}\end{matrix}\right\} ** \ \text{positive constant}$$

On the left side of the equation, you specify a name for the results of the operation — either a variable (temporary name for intermediate results) or a key for identifying the results to be stored in the Interval Database. You must input a unique customer-id, channel-number combination for a new key.

On the right side of the equation, you specify the operands and the operations you want performed. Your options are:

- **existing key, start** — the key must be a valid customer-id, channel-number combination (or statistics-name, stratum-number). The optional start parameter enables you to override, for just that cut, the date range supplied in the Environment File. If the start is supplied and the cut's date range does not match the current date range, missing intervals will be used or the cut's data will be truncated to fill the intervals of the date range.
- **variable** — the name of the results from another operation or transformation.
- **constant** — the constant refers to a real scalar value. Unsigned numbers are assumed to be positive. A "+" sign is neither required nor allowed.

The operator signs enable you to specify the operation you want performed:

+add

-subtract

*multiply

/divide

**exponentiate

Note: There is no limit to the number of operands that can be included on the right side of the equation. To group operations, include them within brackets ([ ]). When including multiple operations, the programs performs operations in the following order:

1. All operations within brackets
2. All operations involving exponents
3. All multiplication and division operations
4. All addition and subtraction operations

Figure 16-3: Sample Transformation Control File is a sample Control File made up of arithmetic Transformation commands.

```
SUM1    =     B011, 1 + B012, 1

SUM2    =     SUM1 + B013,  1

B01TOT, 1 = SUM2 * 1.09
```

Meaning

Add the interval data in cut “B011, 1" to that in “B012, 1". Temporarily save the results as “SUM1”.
Add “SUM1" to “B013, 1" and hold the results as “SUM2".
Multiply the interval data in “SUM2” by a constant (1.09) and store the results in the Interval Database as a new cut called “B01TOT, 1".

Figure 16-3 Sample Transformation Control File

This Control File shows how the interval data for three cuts can be summed to create a new record.

Another Type of Transformation Command — Transformation Functions

You can also construct commands to perform various other Transformation functions. A table of the available functions and their applications is shown below. A description of the format for each type of Transformation Function Command follows, in alphabetical order (Figure 14-4: Table of Transformation Functions).

FUNCTION	**DESCRIPTION**
CLAss	Class conversion (rescales analysis statistics to population levels)
DEScriptor	Description (assign DESCRIPTOR)
DURation	Duration curve (sorts data into descending order)
KVA	Computes kVa $(kVa = \sqrt{kW^2 + kVar^2}$
KVAR	Computes kVar $\left(kVar = \frac{2*kQ - kW}{\sqrt{3}}\right.$
MASK	Masking (selectively creates output cuts of “0" and “1" values based on comparison test)
PERcent	Percent of Peak (rescales data from maximum value)
PROrate	Prorate (rescales a cut’s energy to a specified value)
ROLling	Rolling intervals (creates array of rolling intervals)
SQRt	Square root (same as “**0.5")
TOD	Type-of-Day (creates output cuts by type-of-day)
TOU	Time-of-Use (creates output cuts by time-of-use period)
UOM	Unit-of-Measure (assign UOM)

Figure 14-4 Table of Transformation Functions

Note: Functions whose names include ‘(single function)’ must be the only operand on the right hand side of the equation.

Additional Functions

These additional functions calculate the statistics of a cut. They return a series of intervals (cut or temp variable) with all the same value consisting of the average, maximum or minimum whole interval value over the date range of the transformation of the supplied temporary variable of requested cut.

FUNCTION	DESCRIPTION
MAX	Return a cut or temporary variable of the max interval in the cut.
MIN	Return a cut or temporary variable of the minimum value in the supplied cut.
ANM	Return a cut or temporary variable of the average of all interval values in the supplied cut that are not missing intervals.
COU	Return a cut or temporary variable of the total interval count in the supplied cut.
SUM	Return a cut or temporary variable of the summation of all interval values in the supplied cut.
ABS	Return a cut or temporary variable of the Absolute Values of all interval values in the supplied cut.
VAL	The interval date-time will be formatted according to the local but must be to the second and be a valid Load Analysis start date-time.

Note about the general format of Transformation Function commands:

Format:

$$\left\{\begin{matrix}\text{new key to be written}\\ \text{variable (temporary key)}\end{matrix}\right\} = \text{keyword}\left(\left\{\begin{matrix}\text{existing key[,start]}\\ \text{variable}\\ \text{constant}\end{matrix}\right\}\text{[;option][;option]}\right)$$

Example:

TEMP=MAS(N1725,107/01/98;>=;1.2;'a')

Note that there is no space between the keyword and the arguments, the arguments are enclosed by parentheses, and the optional parameters are separated by semicolons.

On the left side of the equation, you specify a name for the results of the transformation — either a variable (temporary name for intermediate results) or a key for identifying the results to be stored in the Interval Database. For a variable, you can input up to 20 alphanumeric characters. For a new key, you must input a unique customer-id, channel-number combination.

On the right side of the equation, you specify the Transformation Function Keyword (CLASS, DURATION, etc.) and the arguments. You need enter only the first three characters of the keyword. The entire set of arguments following the keyword must be enclosed in parentheses. Do not put blanks between the keyword and the arguments. If you use the optional parameters at the end of the command, they must be preceded by semicolons.

If you use an existing key as an argument, your input must be a valid customer-id, channel-number combination (or statistics-name, stratum-number). The optional start-time enables you to override, for just that cut, the date range supplied in the Environment File.

Class Function (ELDB Only)

$$\left\{\begin{matrix}\text{new key to be written}\\ \text{variable (temporary key)}\end{matrix}\right\} = \text{CLAss(sample-level-analysis-statistics)}$$

This function rescales analysis statistics from sample levels up to population levels. It can be used on statistics generated by Standard Load Analysis, Ratio Analysis, and/or Aggregate Analysis. The CLAss function cannot be used on a temporary variable.

A sample command:

TOTAL,1 = CLA(STAR-MXEN-MEAN,0)

Descriptor Function (single function)

$$\left\{\begin{matrix}\text{existing key}\\ \text{variable (temporary key)}\end{matrix}\right\} = \text{DES(descriptor)}$$

Notes: Descriptors cannot contain a close parentheses. This function must only appear on the right hand side of the equation. No other operations or functions can exist on this line.

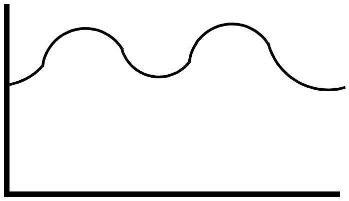
This function allows specification of a new descriptor for a cut. The descriptor may be up to 80 characters in length, and can contain any valid characters. The parentheses are required, and serve to delimit the Descriptor text. The cut must exist in the data source.

Duration Function

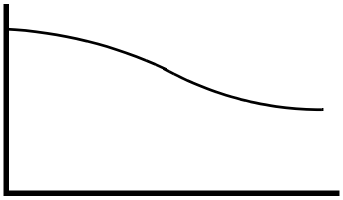
$$\left\{\begin{matrix}\text{new key to be written}\\ \text{variable (temporary key)}\end{matrix}\right\} = \text{DURation}\left(\left\{\begin{matrix}\text{existing key[,start]}\\ \text{variable}\\ \text{constant}\end{matrix}\right\}\right)$$

This function sorts data in descending order. It is useful for organizing data before graphing. A sample command:

DURCP,1 = DUR(TEMP1)



Data before the Duration Command



Data after the Duration Command

KVA Function

$$\left\{\begin{matrix}\text{key}\\ \text{variable}\end{matrix}\right\} = \text{KVA}\left(\left\{\begin{matrix}\text{key[,start]}\\ \text{variable}\end{matrix}\right\}\left\{\begin{matrix}\text{;key[,start]}\\ \text{;variable}\end{matrix}\right\}\right)$$

This function computes kVa as follows:

$$kVa = \sqrt{kW^2 + kVar^2}$$

The command accepts two arguments, which can be cuts or variables. The computation is performed on an interval-by-interval basis for all non-missing intervals. The first argument contains kW and the second argument contains either kVar or kQ. If kQ is provided as the second argument, the program first calculates and derives kVar, and then uses the results to calculate KVA. All computations are performed in demand units; therefore, if engineering units are input, they are first converted to demand by multiplying by the intervals-per-hour (IPH). The two arguments must both represent either “in” or “out” data. The following combinations of units-of-measure are accepted:

Argument 1	Argument 2
01 kWh*	03 kVarh*
02 kW	06 kQd*
03 Ind. Totalized kWh*	08 kQh*
	22 kVar
	33 Ind. Totalized kVarh*
	56 Leading kVarh*
	58 Lagging kVarh*
OR	
51 kWh - Out*	53 kVarh - Out*
52 kW - Out	51 Leading kVarh - Out
	59 Lagging kVarh - Out
	72 kVar - Out

* converted to demand

The resultant cut will have a unit-of-measure of either 23 (kVa) or 73 (kVa-Out). Any other combinations of input will cause a warning to be printed, and the calculation will not be performed.

KVAR Function

$$\left\{\begin{matrix}\text{key}\\ \text{variable}\end{matrix}\right\} = \text{KVAR}\left(\left\{\begin{matrix}\text{key[,start]}\\ \text{variable}\end{matrix}\right\}\left\{\begin{matrix}\text{;key[,start]}\\ \text{;variable}\end{matrix}\right\}\right)$$

This function computes kVar as follows:

$$kVar = \frac{2 *\ \mathrm{kQ} - kW}{\sqrt{3}}$$

The command accepts two arguments, which can be cuts or variables. The computation is performed on an interval-by-interval basis for all non-missing intervals. The first argument contains kW and the second argument contains kQ. All computations are performed in demand units; therefore, if engineering units are input, they are first converted to demand by multiplying by the intervals-per-hour (IPH). The two arguments must both represent either “in” or “out” data. The following combinations of units-of-measure are accepted:

Argument 1	Argument 2
01 kWh*	06 kQd*
02 kW	08 kQh*
31 Ind. Totalized kWh*	38 Ind. Totalized kQh*

Argument 1	Argument 2
OR	
51 kWh - Out*	55 kQh - Out*
52 kW - Out	

* converted to demand

The resultant cut will have a unit-of-measure of either 22 (kVAR) or 72 (kVAR-Out). Any other combinations of input will cause a warning to be printed, and the calculation will not be performed.

Mask Function

$$\left\{\begin{array}{c}\text{new key to be written}\\ \text{variable(temporary key)}\end{array}\right\} = \text{MASk}\left(\left\{\begin{array}{c}\text{existing key[,start]}\\ \text{variable}\\ \text{constant}\end{array}\right\}\left[\begin{array}{c}\text{;comp}\\ \underline{\text{;=}}\end{array}\right]\left[\begin{array}{c}\text{;value}\\ \ \end{array}\right]\left[\begin{array}{c}\text{;'status'}\\ \underline{\text{;' '}}\end{array}\right]\left[\begin{array}{c}\text{;'alt.status'}\\ \underline{\text{;'9 '}}\end{array}\right]\right)$$

This function is used to create a mask of “0” and “1” values based on the data in a cut. The cut can be multiplied by the mask to create a new cut that contains only the data of interest. An example of the use of the Mask function is to identify intervals for which the energy use exceeds a set threshold.

The command contains four optional parameters, which you use to define the data of interest (e.g., the data you want in the new cut).

comp — specifies the type of comparison to be performed. Your choices are:

=equal to (this is the default)

#not equal to

>greater than

<less than

>=greater than or equal to

<=less than or equal to.

value — the value to be compared against. You can input a numeric value or a status code (indicate a status code by placing the value within single ‘quotes’).

status — the status code you want assigned to intervals passing the comparison test. The default is blank.

alternate status — the status code you want assigned to intervals failing the comparison test. The default is ‘9’.

A sample command:

```
T001 = MAS(N1725,1;>=;1.2;‘A’)
```

This instructs Oracle Utilities Load Analysis to create a new cut from the cut “N1725,1”; a new cut whose intervals contain a value of 1 if the energy value in the corresponding interval of “N1725,1” is greater than or equal to 1.2, and ‘0’ otherwise. All intervals with value 1 in the new cut will be assigned a status code of ‘A’; all 0 intervals will be assigned a status code of ‘9’ (the default).

Percent Function

$$\left\{\begin{matrix}\text{new key to be written}\\ \text{variable (temporary key)}\end{matrix}\right\} = \text{PERcent}\left(\left\{\begin{matrix}\text{existing key[,start]}\\ \text{variable}\end{matrix}\right\}\right)$$

This function is used to normalize a cut or variable by its respective maximum or peak value. It divides every interval in a cut or variable by its maximum value and stores the results in another cut or variable. This is often used before graphing.

Power Factor Function

$$\left\{\begin{matrix}\text{key}\\ \text{variable}\end{matrix}\right\} = \text{PWF}\left(\left\{\begin{matrix}\text{key[,start]}\\ \text{variable}\end{matrix}\right\}\left\{\begin{matrix}\text{;key[,start]}\\ \text{;variable}\end{matrix}\right\}\right)$$

This function computes Power Factor as follows:

$$PowerFactor = \frac{KW}{KVA}$$

The command accepts two arguments, which can be cuts or variables. The computation is performed on an interval-by-interval basis for all non-missing intervals. The first argument contains kW and the second argument contains KVA. All computations are performed in demand units; therefore, if engineering units are input, they are first converted to demand by multiplying by the intervals-per-hour (IPH). The two arguments must both represent either “in” or “out” data. The following combinations of units-of-measure are accepted:

Argument 1	**Argument 2**
01 kWh*	03 kVarh**
02 kW	22 kVar
31 Ind. Totalized kWh*	23 KVA
	24 KVA Ratio
	33 Ind. Totalized kVarh*
	56 Leading kVarh*
	58 Lagging kVarh*

* converted to demand

Prorate Function

$$\left\{\begin{matrix}\text{new key to be written}\\ \text{variable (temporary key)}\end{matrix}\right\} = \text{PROrate}\left(\left\{\begin{matrix}\text{existing key}\\ \text{variable}\end{matrix}\right\}\text{[Prorated Energy]}\right)$$

This function is used to rescale a cut’s energy to a specified energy value. The function creates an interval multiplier and uses this multiplier on all intervals of the supplied cut. The argument “prorated energy” is the energy value used to calculate the interval multiplier. The resultant cut will have its interval total equal to the value supplied in the “Prorated Energy” parameter.

Rolling Function

$$\left\{\begin{array}{c}\text{new key to be written}\\ \text{variable (temporary key)}\end{array}\right\} = \text{ROLling}\left(\left\{\begin{array}{c}\text{existing key[,start]}\\ \text{variable}\end{array}\right\}\left[\begin{array}{c}\text{;spi}\\ \underline{\text{;3600}}\end{array}\right]\right)$$

This function is used to construct a cut or variable of rolling intervals. (Rolling means that the intervals are averaged, smoothing out high or low values.)

The argument “spi” is used to indicate the number of seconds included in each rolling interval. The value for “spi” must be greater than, and a multiple of, the input cut’s interval length.

To form an output interval, the input cut‘s intervals are averaged together. For example, if the input has data in 1800-second intervals and you specify rolling intervals of 3600 seconds, then for every interval of the input cut the corresponding output cut interval will be the average of the prior interval value and the value of the interval itself.

If any input interval is missing or unavailable, it is not involved in the averaging. For that reason, the first few rolling intervals of the output cut may be incomplete.

The output status code is set to the worst of the input status codes. However, if an input interval was missing or unavailable, the output status code can be no better than ‘5’.

Square Root Function

$$\left\{\begin{array}{c}\text{new key to be written}\\ \text{variable (temporary key)}\end{array}\right\} = \text{SQRt}\left(\left\{\begin{array}{c}\text{existing key[,start]}\\ \text{variable}\end{array}\right\}\right)$$

This function performs a square root calculation on a cut, variable, or constant. When the argument is a cut or a variable, the square root calculation is performed on an interval-by-interval basis for all non-missing intervals. This is the same as exponentiating by a value of 0.5, and can be used in the equation for kVA, for example.

Type-Of-Day Function

$$\left\{\begin{array}{c}\text{new key to be written}\\ \text{variable (temporary key)}\end{array}\right\} = \text{function-name}\left(\left\{\begin{array}{c}\text{existing key[,start]}\\ \text{variable}\\ \text{constant}\end{array}\right\}\left[\begin{array}{c}\text{;status}\\ \underline{\text{;' '}}\end{array}\right]\right)$$

This function is used to create a cut containing only intervals of a specified type of day, such as week day, weekend, weekend holidays, Sundays, etc. (In other words, all other intervals in the input cut are masked out — set to missing.)

function-name — your options are:

WKD — week day

WKN — weekend

WDX — week day excluding holidays

WNX — weekend excluding holidays

WDH — week day holiday

WNH — weekend holiday

SUN — Sunday

MON — Monday

TUE — Tuesday

WED — Wednesday

THU — Thursday

FRI — Friday

SAT — Saturday

‘status’ — use this parameter to indicate the best allowable status code to be assigned to those intervals that fall within the specified type-of-day. Blank is the default.

Time-Of-Use Function

$$\left\{\begin{array}{c}\text{new key to be written}\\ \text{variable(temporary key)}\end{array}\right\} = \text{TOU}\left(\left\{\begin{array}{c}\text{existing key[,start]}\\ \text{variable}\\ \text{constant}\end{array}\right\}\left[\begin{array}{c}\text{;sched\#}\\ \underline{\text{;1}}\end{array}\right]\left[\begin{array}{c}\text{;tou}\\ \underline{\text{;1}}\end{array}\right]\left[\begin{array}{c}\text{;'status'}\\ \underline{\text{;' '}}\end{array}\right]\left[\begin{array}{c}\text{;'alt.status'}\\ \underline{\text{;'9 '}}\end{array}\right]\right)$$

This function is used to create a cut containing only intervals of a specified time-of-use period. (In other words, all other intervals in the input cut are masked out — set to missing.) ***Note:*** The time-of-use periods are defined in your Time-Of-Use Schedule File.

sched# — use this parameter to indicate the desired schedule from your Time-Of-Use Schedule File. Schedule 1 is the default.

tou — use this parameter to indicate the desired time-of-use period within the Time-Of-Use Schedule File. Period 1 is the default.

status — use this parameter to indicate the status code to be assigned to those intervals that fall within the specified time-of-use. Blank is the default.

alternate status — use this parameter to indicate the status code to be assigned to intervals outside the desired time-of-use period. ‘9’ is the default.

Unit-of-Measure Function (single function)

$$\left\{\begin{array}{c}\text{new key to be written}\\ \text{variable (temporary key)}\end{array}\right\} = \text{UOM (3-digit unit-of-measure code)}$$

This function is used to assign a new unit-of-measure to an existing cut or to a temporary variable. After a transformation, the values in a cut very often have a new meaning. The 2-digit codes are listed in *Appendix J: Oracle Utilities Unit of Measure Codes* and in the *Quick Reference Guide.*

Note: A cut that is the result of transformations on one or more cuts with *matching* unit-of-measure codes will automatically be assigned that code unless the Unit-of-Measure function is used to modify it. This function should always be used for assigning a unit-of-measure code for *any other* generated cut.

Steps for Using the Transformation Program

Now that you know the potential applications and structure of the Transformation commands, let’s run through the steps for actually running the Transformation program.

Use of the Type-of-Day function requires the Holiday File; use of the Time-of-Use function requires the Time-of-Use Schedule FiIe and the Holiday File.

Summary — Using the Transformation Program (Y620)

1. Create the Transformation Environment File (TGY62B.ENV).
2. Create the Transformation Control File (TGY62A.CTL).
3. Run the Transformation Program (Y620).
4. Check output.

Step 1: Create the Transformation Environment File (TGY62B.ENV)

Use the Environment File to specify the transformation period, the minimum quality status code, and the level of aggregation. The format of the Environment File is shown below. You can input the commands in any order, but only one command and its associated parameters may appear per line. You need to enter only the first three letters of a command keyword. Blanks or commas may be used as delimiters between parameters.

DATe *start-time stop-time*

QUAlity [‘*q*’ | ‘8’]

AGGregate [*n* | 3600]

STOP [NO [IGNore] | YES]

MERge [YES | NO | EXClude]

UOM *default UOM code*

XML

GRAph

TRIal

DATe *start-time stop-time*

Date — a required command that establishes the date range spanned by the cuts to be transformed. Use the “mm/dd/yy-hh:mm:ss” or “mddyyhhmmss” format. If you leave the hours, minutes, and seconds blank, they will default to 00:00:00 for the start-time and 23:59:59 for the stop-time.

You may override this date range for a particular Control File block via the BDATE Command. This command is similar to the DATE Command; if used, it must immediately follow the BLOCK Command. The syntax is:

BDA block-start-time block-stop-time

Note: If a start-time is specified for a cut key in the Control File, then only intervals from that cut that fall within the date range will be used. This option is used to exclude other cuts from consideration even if they overlap the date range.

QUAlity [‘*q*’ | ‘8’]

- **Quality** — an optional command that restricts the range of acceptable status codes for each interval of data. Use the parameter “q” to indicate the worst acceptable status code. You must enclose your entry for “q” in apostrophes (‘’). For any interval with a status code worse than “q”, the program will treat it as missing.

  The default for this command is ‘8’ — in other words, all non-missing data is selected for transformation.

AGGregate [*n* | 3600]

- **Aggregate** — *for load data records only* — specifies the level of aggregation in seconds-per-interval. The parameter “n” represents the number of seconds in each interval, and must be a factor of 3600 (i.e., 300, 900, 1800, or 3600). If possible, the interval data will be summed to the indicated level. The default is 3600.

Depending upon the type of interval data, the program will either *sum* or *average* the intervals when aggregating them to a lower frequency. The aggregation method used by Oracle Utilities Load Analysis for each UOM is noted in *Appendix J: Oracle Utilities Unit of Measure Codes*.

Do **not** attempt to aggregate data in statistics records that do not represent interval data.

STOP [NO [IGNore] | YES]

- **Stop** — specifies whether or not you want the program to stop processing when it encounters a command block containing an error, or when it cannot find a requested input cut. If you input STOP YES, the program will stop when it finds an error. If you input STOP NO, the program will skip the faulty block and will continue processing the next one. If you input STOP NO IGNORE and the requested cut cannot be found, the program continues processing as if the requested cut contained all missing data. All intervals are treated as 0, and all status codes are treated as '9' and the UOM of this cut is set to KWH unless the UOM command is set, in which case the cut's UOM will be the value in the UOM command. STOP YES is the default.

MERge [YES | NO | EXClude]

- **Merge**— An optional command. When set to "YES", the program will merge all cuts found within the specified date range regardless of validation status. When set to "NO" (default), the program will reject invalid cuts and return an error message indicating the cuts are not merge-able. When set to "EXClude", the program will merge all cuts found within the specified date range, but exclude all invalid data.

UOM *default UOM code*

- **UOM**— An optional command that sets the default unit of measure (UOM) code to any cuts written back to the database that have not had their UOM code's set by either an existing cut or by calling the UOM function.

XML

- **XML**— An optional command that directs the program to create an output file of all cuts written to the database to be used in the Display Tool.

GRAph

- **Graph**— An optional command that directs the program to produce a SYSGRAPH graphing file for all cuts written

TRI

- **TRI** — Allows users to perform transformations in a "trial" mode to ensure that there are no errors and to not change the database. Combine this option with XML and/or GRAph to produce output files of the results without writing anything to the database.

```
DATE   07/01/98      07/31/98

AGG    3600

QUA    'L'

STO    NO

XML
```

Figure 14-5 Sample Transformation Environment File

Step 2: Create the Transformation Control File (TGY62A.CTL)

Use the Transformation commands to specify the data manipulations you want performed. See **Using the Transformation Commands** on page 15-2 if you need to review these commands.

Step 3: Run the Transformation Program

Use Y620.

Transformation Processing

The Transformation Program first reads in the Environment File. The contents of the file are examined for errors, and fatal errors are reported with a diagnostic. Transformation environment parameters not specified are set to the default.

The transformation requests contained in the Control File are processed one at a time. Input cuts are located in the Interval Database and shaped to fit the specified date range. The function or arithmetic operation is performed, and the result is stored in the receiving cut or variable. It will be held in storage until it is re-used or a BLOck command is encountered.

Control File 1

```
BLO
A0001,1 = A0001,2 + A0001,3
B0001,1 = A0001,1 + A0001,4
```

Control File 2

```
BLO
TEMP    = A0001,2 + A0001,3
B0001,1 = TEMP + A0001,4
```

The status code assigned to each interval of the transformed cut is usually the lowest quality status code of the corresponding intervals of the input cuts. The one exception to this is missing data; if the status code of either cut is missing and the other is not, the status code of the resulting cut is set to "7". If the resulting status code is worse than the value specified in the QUALITY Command of the Environment File, the data for that interval is set to 0 and the status code is set to missing data. However, if a receiving cut has no intervals within the quality range, the transformation is not performed and an error message is issued.

The unit-of-measure code will be assigned automatically if the cut is the result of transformations on cuts with matching units-of-measure. Otherwise, a warning is produced and the cut is generated with a code of 16. If the UOM command is in the environment file, the specified UOM will be used.

The transformation period can span a varying number of days. This includes periods spanning a month boundary (e.g., 06/15/98 to 07/15/98), short periods (e.g., 07/02/98 to 07/05/98), and periods longer than a calendar month (e.g., 06/15/98 to 08/30/98). The length of the transformation period *cannot exceed one year of 900-second data, or four years of 3600-second (hourly) data* (36000 intervals). If the optional start-time parameter is used, the transformations begin using the first interval of the cut and continue for the same number of intervals as there are intervals corresponding to the date range.

If a cut produced by a transformation is given the same key as a cut already residing on the Interval Database, the *Interval Database cut is automatically overwritten.*

If the STOP Command in the Environment File was set to "YES" and an error is found in a transformation request, or if a requested input cut is not found, all transformation processing will stop and a Return Code of 10 will be produced. If the STOP Command was set to "NO" and an error is found, the remaining Transformation commands in the block containing the error will not be performed, and processing will continue with the next BLOCK Command.

Chapter 16

Making Oracle Utilities Load Analysis Data Available for External Applications (X710, Y710, X720, X740, Y720, Y740, Y780)

Despite Oracle Utilities Load Analysis's extensive capabilities, there may be times when you want to apply other programs to your Oracle Utilities Load Analysis data — such as user-written programs, other utility software, or spreadsheet packages. This chapter describes two Oracle Utilities Load Analysis programs you can use to make your data available for external applications:

- **Direct Output Program**
- **Steps for Using the Direct Output Program**
- **The Direct Output Format (.INP)**
- **Daily Output Format**
- **Statistical Package Interface Program (X710, Y710)**
- **Steps for Using the Statistical Package Interface Program (X710, Y710)**
- **Statistic Extraction Program (Y780)**
- **Steps for Using the Statistic Extraction Program (Y780)**

There are three choices for making Oracle Utilities Load Analysis data available for ad hoc analysis and other external application programs:

I - Direct Output Program — similar to the Direct Output Program, but the output can be in one of several formats, including:

- **LSE**: The Oracle Utilities Enhanced Input/Output interval data format.
- **CSV**: comma-separated values format.
- **DAI**: The Daily Energy format. See the DAIly command on page 16-8 for more information about this format.
- **INP**: The Oracle Utilities Load Analysis standard pulse format. See **The Direct Output Format (.INP)** on page 16-14 for more information about this format.
- **XML**: "compact" XML format (see the *Oracle Utilities Energy Information Platform Configuration Guide* for more information about this format).
- **GRAph**: Produces the graphing file, SYSGRAPH.HTM for graphical display of all cuts extracted.

II - Statistical Package Interface Program — reformats load data contained in CLDB or ELDB cuts into a matrix format with a matching file of header information that can be read by external applications.

III - Statistic Extraction Program — extracts specified cuts or statistics over multiple analysis rate classes over multiple analysis periods into a CSV file that may be imported into a spreadsheet or reporting tool.

These programs are discussed in detail in the remainder of this chapter.

> **Note:** The current CSV format is time-aligned which means all cuts extracted will be aligned to a single common date/time column. For example, if a cut begins at a later date/time, data for that cut will begin at a later row. Unlike the older format, this newer one includes status codes.
>
> Should for any reason, users prefer the older CSV format, they can do so by adding the following GLB setting:
>
> CSVFORMAT OLD

Direct Output Program

The Direct Output programs are X720 (CLDB), Y720 (ELDB), X740 (ALDB), and Y740 (SLDB). All of these are accessible from the Direct or Production Output submit screen.

These programs are used to output load data and/or statistics from any of the major Oracle Utilities Load Analysis databases (ELDB, SLDB, CLDB, ALDB) in a format that is compatible with most computer languages, including Java, VBS, C, and C++. The data is thus available for use with user-written or other application programs. The output format is also suitable for transmission via the Internet.

With Direct Output, you can output individual cuts, cut series, or subsets of a cut series. There are no limits to the number of cuts; in fact, you can easily output the entire contents of a database.

> **Note:** Cuts that make use of the Enhanced Format specifications (i.e., custid length > 20, etc.) are not eligible for extraction via .INP format.

The programs transform the data into a simple sequential format and write it out to a sequential data set. Interval data is recorded as “energy.” You can keep status codes with the interval data.

Oracle Utilities Load Analysis includes a companion program called Direct Input (TGX110 - see *Oracle Utilities Load Analysis Load Data Management User’s Guide*) that makes it possible to manipulate data outside of Oracle Utilities Load Analysis and return it for storage to one of the Oracle Utilities Load Analysis databases — e.g., when you want to add transmission and distribution losses to class profiles and keep the results in the SLDB.

Note: The X720 and Y720 program supports embedded SQL commands. See **Querying the Database with Embedded SQL** on page 4-7 for more information. The programs also supports pre-process key generator. See **Using the Preprocess Key Generator in a Control File** on page 4-4 for more information.

Steps for Using the Direct Output Program

Here is a brief list of the steps you will follow when using the Direct Output Program to output load data and/or statistics from one or more of Oracle Utilities Load Analysis's four major database types. These steps are described in detail on the following pages. The formats of the output files are described in **Appendix B: Enhanced Oracle Utilities Input/Output Format** in the *Oracle Utilities Load Analysis Configuration Guide*.

Table 1:

Summary — Using the Direct Output Program
1. Verify that the data you wish to output is in the source database(s).
2. Create the Direct Output Control File (TGY72A.CTL).
3. Create the Direct Output Environment File (TGY72B.ENV).
4. Run the program.

Figure 15-1: Direct Output Program summarizes the inputs you must provide and the outputs you can expect.

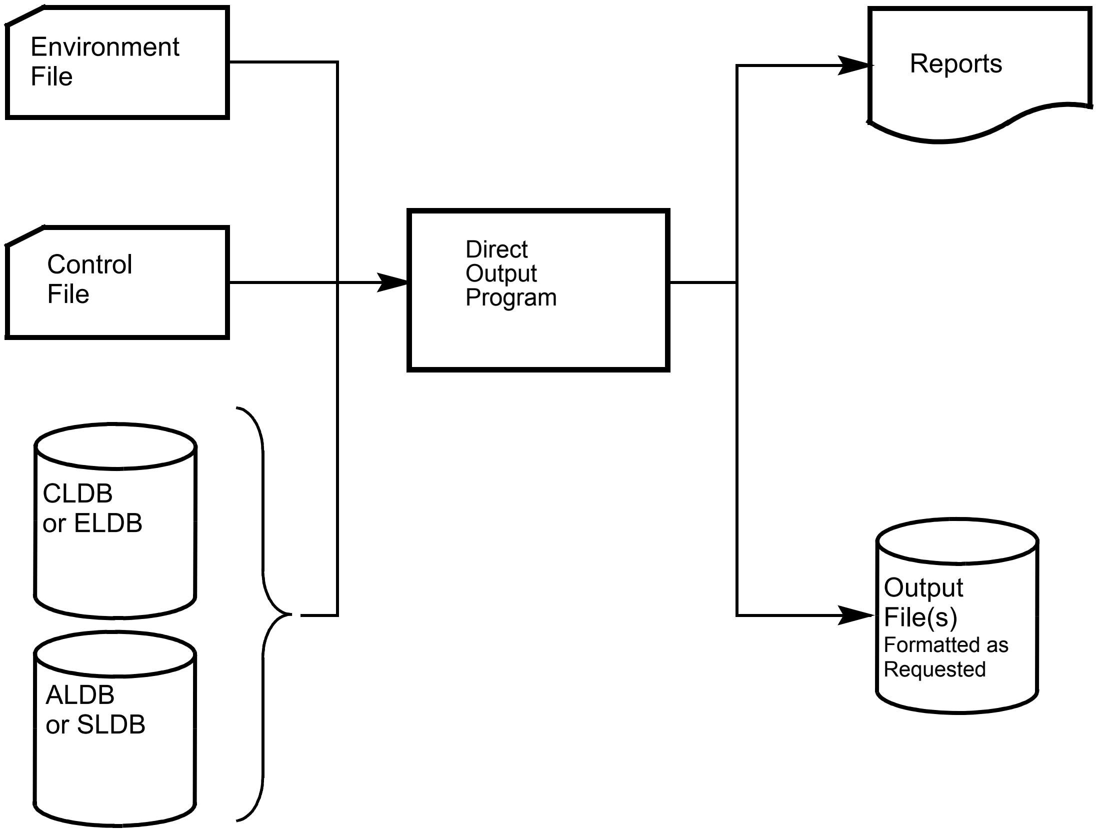


Figure 15-1 Direct Output Program

Step 1: Verify that the Data you wish to Output is in the Source Database(s)

In the Environment File, specify which of the major Oracle Utilities Load Analysis databases you want to use as the data source — CLDB, ALDB, ELDB, or SLDB. You can specify any one of the databases or a combination (either the CLDB/ALDB, or the ELDB/SLDB). If you specify CLDB/ALDB and a key in your Control File has data in both databases, the cut will be read from the CLDB. Similarly, if you specify ELDB/SLDB and a key in your Control File has data in both databases, the cut will be read from the ELDB.

> **Note:** Not all Control File and Environment File options are available for all databases. These restrictions are explained in the following pages and summarized in Table 16-4.

Step 2: Create the Direct Output Control File (TGY72A.CTL)

The Control File contains the keys of load data records and/or statistics that you want to output, along with some optional parameters. The format for each Control File record is shown in the box below.

You can include any number of records in a Control File.

customer-id, *channel* [,*start-time*][,*stop-time*][,**INActive** | ,**<u>ACTive</u>**] [,**CLAss**]

- **customer-id, channel** (*required*) — enter the Oracle Utilities Load Analysis customer-id, channel for load data records, or the statistic-id, stratum for statistics.
- **start-time** (*optional*) — supply the cut's start-time if you want to output interval data for the recording period of the cut. If you want instead to output interval data for a cut series (merged cuts) over a different date range, omit the start-time here and specify the date range using the Date Command in the Environment File.

  If you supply a cut's start-time in the Control File *and* a Date Command in the Environment File, then only that data in the cut specified in the Control File that falls within the period indicated in the Date Command will be extracted and written to the output file. The Date Command will determine the start time and stop-time of the output data, and any intervals within that period that cannot be filled from the specified cut will be written as missing intervals (status code = '9', value = 0). If there are *no* intervals in the specified cut for the period indicated in the Date Command, no output will be written, and a message indicating this will be written in the Execution Log.

  If you do not supply a Date Command in the Environment File, you **must** supply a start-time for every customer-id, channel record specified.

  > **Note:** If you wish to output invalid data from the CLDB, you must specify the start-time of the cut. (Invalid data cannot be merged into a cut series. You can only output it as individual cuts.)

- **stop-time** (optional) — supply the cut's stop time if you want override the stop time specified in the Date command in the Environment file for the cut.
- **Active/Inactive** (*optional*) — in the case of an edited cut, this parameter specifies whether edited data (ACTIVE) or original data (INACTIVE) should be written out. The default is ACTIVE. See *Chapter 6* for details about the Load Data Editor.

  > **Note:** INACTIVE may be specified only for the CLDB (inactive records cannot be retrieved from the ALDB, SLDB, or ELDB). If you specify INACTIVE and no inactive records are available on the CLDB, the program will issue an error message.

- **Class** (*optional*) — this parameter is used to scale analysis statistics (sample mean and variance of the mean) to the class level (class total and variance). If you do not specify this option, the analysis statistics will be reported at the level at which they were originally written.

Important note: If you specify the Class option for an "ineligible" record, the program will consider it an error. In that case, the program will not extract the record, but will alert you with a diagnostic message in the Execution Log. *In other words, you can apply the Class option only to analysis statistics cuts whose identifiers include one of the following*: *MEAN, SExx, xMEN*. Load data records, records whose source is the CLDB or ALDB, and analysis statistics cuts with other IDs are all considered ineligible.

> **Note:** The program will assign the suffix "CL" to the ID of the resulting statistics. An example of a statistic-id before and after scaling is as follows:

before	STAR-ENTR-MEAN
after	STAR-ENTR-MEAN-CL

If the length of the new statistic ID is greater than 64 characters, the rightmost 64 characters of the new ID will be used.

```
A0100, 1, 03/12/98-16:45:00, INACTIVE
B3194, 2
C0047, 1
C0096, 1
D0288, 1
F3424, 2, 03/02/98-10:05:00
STAR-ENTR-MEAN, 0, CLA
```

Figure 15-2 Sample Direct Output Control File

Step 3: Create the Direct Output Environment File (TGY72B.ENV)

The Environment File describes the source database, date range, and other data selection characteristics. The commands are summarized in Figure 15-3: Format of the Direct Output Environment File. When creating the file, enter one command per line. Each line must begin with the command name (keyword); but you need enter only the first three letters of the keyword. You may enter the commands in any order. If you do not specify a command, the program will assume the default (underlined). Following is a detailed description of each command

24Hradj [**YES** | **NO**]

AGGregate [*n* | 0]

CDAt *start-date stop-date*

CSV

DAIly [**SENdout** [*h* | 0]] [**FOR** [*x.y* | 7.3]] [**HEAder**] [**DATe**]

DATe *start-date stop-date*

EEI

INP

LSE

MERge [**YES** | **NO** | **EXClude**]

ONErecord

QUAlity [‘*q*’ | ‘8’]

ROLling [*n* | 3600 [‘*q*’ | ‘8’]]

SOUrce {**ELDB** | **SLDB**}[**BOTH**][2]

STAtus [**NO** | **YES**]

XML

GRAph

Figure 15-3 Format of the Direct Output Environment File

```
DATE          03/01/98-00:00:00 03/31/98-23:59:59 /* OUTPUT 3/98 DATA
AGGREGATE     1800
QUALITY       ‘L’
STATUS        NO
24HRADJ       NO
SOURCE        ALDB
```

Figure 15-4 Sample Direct Output Environment File

24Hradj [**YES** | **NO**]

- **24Hradj** (*optional*) — Use this command to specify whether or not an adjustment should be made for data that crosses a daylight savings time boundary. Setting the 24Hradj Command to “YES” causes the data that crosses a daylight savings time boundary to be adjusted as follows. If a cut crosses the spring boundary, then an extra hour of missing data with value zero and status code “9” is inserted after the interval ending at the applicable hour on the day of the Spring DST change. If a cut crosses the fall boundary, then similar intervals from the two fall hours on the last full DST day are averaged together. If 24Hradj is set to “NO”, then no adjustment is made to the data, and it is reported as stored (on a local basis). For example, if the date range spans all the hours within the spring DST month and 24Hradj is set to “NO”, a total of 719 hours will be written on output. Similarly, if the date range spanned the fall DST month, 745 hours would be written.

  Daylight Saving Time definitions are defaulted to Rules observed in the United States where DST is properly observed. Otherwise, these rules may be overridden in the LSCALENDAR.CFG XML file (See *Energy Information Platform Installation and Configuration Guide*).

  The 24Hradj Command replaces the DST Command of previous releases, but its operation is identical. It was renamed to avoid confusion with the Direct Input DST Command.

  If you plan to reload a cut that has been adjusted into a 24-hour day “daylight savings format,” the 24Hradj Command in Direct Input accepts data that has been output using 24Hradj. The DST-participant of the resultant cut will be assigned “A”.

AGGregate [*n* | 0]

- **Aggregate** (*optional*) — Input “n” to set the number of seconds-per-interval for the output data; 60, 300, 900, 1800, 3600, and 86400 are permitted values. 0 (no aggregation) is the default.

  Where possible, Oracle Utilities Load Analysis will aggregate each customer’s load data to the specified level.

Depending upon the type of data, the program will either *sum* or *average* the intervals. The aggregation method used by Oracle Utilities Load Analysis for each UOM is noted in *Appendix J: Oracle Utilities Unit of Measure Codes*.

CDAt *start-date stop-date*

- **CDAt** (*optional*) — Establishes new start and stop dates for the output data. This command may only be used when the **DATe** Command is specified. The start-time will default to 00:00:00 and the stop-time will default to 23:59:59. When this command is specified, the program replaces the start- and stop-times in the First Header record with the dates specified by the CDAt Command.

  Note: The **CDAt** date range must be the same duration as the date range specified by the **DATe** Command. This command is only operative with a SOUrce of CLDB or ELDB.

CSV

- **CSV** (*optional*) — Creates output in the comma-separated values format.

  Note: The default output format for CSV files shows one time column, one data column and one code column.

DAIly [**SENdout** [*h* | 0]] [**FOR** [*x.y* | 7.3]] [**HEAder**]

- **DAIly** — The DAILY Command directs the program to output data in Daily format, rather than the standard format. In the Daily format file created, each record will contain interval values for a 24-hour period (with possible exceptions for daylight savings time adjustments).

  SENdout h — directs the program to make the starting time of each output record one minute past the specified hour **h**. The stop-time of each record will be **h** o'clock of the following day. For example, if SEN 9 is specified, the starting time of each output record will be 09:00:00 and the stop-time will be 08:59:59 of the following day. Valid values for **h** are 0 through 23. If **h** is omitted, or if the SENdout subcommand is not coded, the default **h** hour will be 0, i.e., each record will begin at 00:00:00 and end at 23:59:59. Whenever the SENdout hour is other than 0, the string 'SENDOUT DAY h — h' will be stored into the First Header record of each cut included in the daily output file being created.

  For x.y — specifies the dimensions of the character-format output data fields, where:

  - X: Represents the size of the field (number of spaces/characters allocated). Decimal digits will be dropped if necessary to fit numbers to X. If dropping decimal digits doesn't suffice, the number will be converted to scientific notation.
  - Y: Represents the desired number of decimal digits to round to.

  For example, 7.3 represents a numeric field size of 7 characters total, rounded to 3 decimal digits. If omitted, the default setting is 7.3.

  HEAder — This option produces the header records for each cut similar to the header records found in the LSE format. See Table 16-1 on page 16-9 for additional information. If omitted, header records will not be produced.

  DATe — This option specifies the format of the date for the output date fields. If the format is not specified, the format will be MM/DD/YY. For example, you would use the following command to output dates in the "YY-MM-DD" format:

```
DAI DATE YY-MM-DD
```

Table 16-1: Header Record for Daily Format File

Header 1: Custid, Channel, Start-time, Stop-time, DST Participant Flag
Header 2: Meter-start, Meter-stop, Meter-multiplier, Pulse-multiplier, pulse-offset, SPI, UOM, Population, TZSN, Weight
Header 3: Descriptor
Header 4: Timestamp

> **Note:** When the Daily File format is created, the DAI.CSV extension will automatically be appended to the Direct Output file name. For example, if the output file on the Submit panel is TEST_OUTPUT and you include the DAII command, the output file will be TEST_OUTPUT.DAI.CSV.

See **Daily Output Format** on page 16-16 for more information about the Daily format.

DATe *start-date stop-date*

- **Date** (*optional*) — Establishes the date range for the output data. You can use the format “mm/dd/yy-hh:mm:ss” or “mmddyyhhmmss”. If you omit the times, the start-time defaults to 00:00:00 and the stop time to 23:59:59. If you omit the Date Command altogether, the program will output the actual recording period of the requested cuts (in that case, you **must** supply a start-time for every customer-id, channel record *in the Control File).*

> **Note:** The Direct Output Program can be run in one of two modes, “Cut Mode” or “Subset Mode,” depending upon how you specify the dates in the Environment File and Control File. In the Cut Mode, the program outputs interval data for the actual recording period of the requested cuts. In the Subset Mode, the program automatically merges cuts from the requested cut series to satisfy the date range you specify in the Environment File. Missing or invalid data within the requested date range is padded with zeros and given a status code of ‘9’.

To run the program in the Cut Mode, supply start-times in the Control File (i.e., every key in the Control File must include a customer-id, channel, and start-time) and omit the Date Command from the Environment File. To run the program in the Subset Mode, omit the start-times from the Control File and supply a Date Command in the Environment File.

> **Note:** The Date Command should not be used when processing Oracle Utilities Load Analysis statistical records. Instead, a Full Key, including start-time, must be specified in the Control File.

EEI

- **EEI** — For data in EEI format, each day is output in two 80-byte records. The formats of these two records are shown in Table 16-2 and Table 16-3. Each subsequent day of data has the same form; only the date and day of the week change.

Data element 2 corresponds to the card identifier. That is, whether the loads on the record are the first 12 hourly loads or the second 12. The day of the week, element 4, is a single digit, where 1 corresponds to Monday, 2 to Tuesday, ..., 7 to Sunday and 8 denotes a holiday.

Table 16-2: Record One of EEI Format Data

ELEMENT	DESCRIPTION	ATTRIBUTES	LENGTH IN BYTES
1	Date (MMDDYY)	CHAR (6)	1-6
2	Card ID ('1')	INTEGER (1)	7
3	System ID	INTEGER (8)	8-15
4	Day of Week	INTEGER (1)	16
5	Time Zone	INTEGER (1)	17
6	Units	CHAR (3)	18-20
7	Hourly Loads	12*INTEGER(5)	21-80

Table 16-3: Record Two of EEI Format Data

ELEMENT	DESCRIPTION	ATTRIBUTES	LENGTH IN BYTES
1	Date (MMDDYY)	CHAR (6)	1-6
2	Card ID ('2')	INTEGER (1)	7
3	System ID (first 3 digits)	INTEGER (3)	8-10
4	Filler	CHAR (7)	11-17
6	Units	CHAR (3)	18-20
7	Hourly Loads	12*INTEGER(5)	21-80

SCAle [**ON** | **<u>OFF</u>**]

- **Scale** (*optional*) — Use this command in conjunction with the EEI command or the character format of the DAIly command. If set to 'ON', this command will automatically scale the EEI or DAIly load data to the energy unit of measure (UOM) that will provide the best precision, unless a specific UOM is set in the EEI command. Energy may be scaled to watts, kW, or MW based on the peak energy value. If the Scale command is not specified or is set to 'OFF', the energy values will be set to MW.

EXClude [*field1*] [*field2*] [*field3*] ... [*fieldn*]

- **Exclude** — An optional command. Works in conjunction with the DAIly command. Any fields listed until this command are excluded from the Daily Output Character file. This command is ignored if the DAIly command is not specified. The fields that can be excluded include:
    - SORt: Sort Code
    - UOM: Unit of Measure
    - DIVision: Divisor
    - TIMezone: Time Zone

- STAtus: Status Code

INP

- **INP** (*optional*) — Creates output in the Direct Input standard format. See **The Direct Output Format (.INP)** on page 16-14 for more information about this format.

LSE

- **LSE** (*optional*) — Creates output in the Enhanced format. See the *Oracle Utilities Energy Information Platform Configuration Guide* for more information about this format.

MERge [**YES** | **<u>NO</u>** | **EXClude**]

- **Merge—** An optional command. When set to "YES", the program will merge all cuts found within the specified date range regardless of validation status. When set to "NO" (default), the program will reject invalid cuts and return an error message indicating the cuts are not merge-able. When set to "EXClude", the program will merge all cuts found within the specified date range, but exclude all invalid data.

ONErecord

- **Onerecord** (*optional*) — Use this command to request that a single record per cut be produced instead of these multiple records. For each cut requested, this record will contain all of the information that would otherwise be written in the multiple LSE records (excluding the 8-digit record number at the beginning of each such record), in the same order in which the LSE records are produced, but in a single record the length of which will be determined by the number of intervals in the requested cut. The end of each record written will be indicated by a 2-byte carriage return-line feed field, or CRLF.

QUAlity ['*q*' | '<u>8</u>']

- **QUAlity** (*optional*) — Use this command to "filter" the output interval data by quality. Input the worst acceptable status code. Any data with a status code worse than 'q' will be reset to the value 0 and assigned a status code of '9' (missing). The default is '8' (all non-missing data is output). You **must** enclose the QUAlity parameter in apostrophes (' ').
- **Note:** You can find a list of Oracle Utilities Load Analysis status codes in *Chapter 3: The Oracle Utilities Load Analysis Data Formats* and in the *Oracle Utilities Load Analysis Quick Reference Guide*.

ROLling [*n* | <u>3600</u> ['*q*' | '<u>8</u>']]

- **Rolling** — This command is most often used for billing purposes, and can be found in rate schedules. This command smooths out demand and reports averages of intervals. Use "n" to specify the interval length you want to average (the result is called the "rolling interval"). "n" must be greater than, and a multiple of, the cut's interval length. For example, let us say that your data exists in 900-second (15-minute) intervals and you have consecutive values of 8, 9, 8, and 16. If you made n=1800 and applied the ROLling option, the 16 would become 12; that is, (8+16) /2=12. Use "q" to indicate the worst acceptable status code involved in the averaging. Often rates for large customers contain a rolling demand clause, and this option is useful in those circumstances.

SOUrce {**ELDB** | **SLDB**}[**BOTH**][2]

- **SOUrce** (*required*) — Use this command to specify the database from which the data will be written. Any of the major Oracle Utilities Load Analysis databases can be specified. CLDB

BOTH indicates that data should be read from both the CLDB and ALDB. ELDB BOTH causes data to be read from both the ELDB and the SLDB. If the same key occurs on the CLDB and ALDB, the cut will be read from the CLDB. Similarly, if the same key occurs on the ELDB and SLDB, the cut will be read from the ELDB. The **2** parameter allows you to specify two separate ALDBs or SLDBs from which the data will be written.

STAtus [**NO** | **YES**]

- **STAtus** (*optional*) — Use this command to specify whether or not output intervals should be accompanied by their corresponding status codes. If you specify YES, both interval data and status codes will be written. With NO, only the interval data will be written. YES is the default.

XML

- **XML** (*optional*) — Creates output in the "compact" XML format. See the *Oracle Utilities Energy Information Platform Configuration Guide* for more information about this format.

GRAph

- **Graph**— Creates the SYSGRAPH file output with extracted cuts for graphing purposes.

  You may want to request multiple formats in a single file.

Step 4: Run the Program (Y720)

Once you have created the necessary input files, you are ready to run the program. Use Y720.

Direct Output Processing

The Direct Output Program processes each key specified in the Control File by locating the cut in the source database, reformatting it, and writing it to the sequential file. Cuts that are not located are ignored, and processing continues with the next cut.

Other considerations regarding restrictions on output data are presented in Table 16-4.

Table 16-4: Direct Output Database Restrictions

DATABASE	RESTRICTION
CLDB	Invalid data may only be accessed in the CUT MODE; CLASS option is not valid.
ALDB	CLASS option is not valid.
ELDB	Metering data in second header output record is set to zero.
SLDB	Metering data in second header output record is set to zero.

The Direct Output Format (.INP)

This section describes the Oracle Utilities Load Analysis *standard* pulse-type format.

Standard Format

For data in the standard Direct Input format, each cut will be represented by four header records followed by one or more interval data records. All records will be in 80-character card image formats, and contain a sort code in bytes 1 - 4. The sort codes on the four header records are 0001 through 0004. Data records' sort codes start at 1000, and are incremented by 1 for each of the data records included. As many as 999 records may be output. Data record values are represented as pulses. Their values are right-justified and padded with zeros. The format of the Standard header records is summarized in Table 16-5, Table 16-6, Table 16-7 and Table 16-8; the format of the Standard data records is summarized in Table 16-9.

Table 16-5: First Header Record Format

ELEMENT	DESCRIPTION	ATTRIBUTES	LENGTH IN BYTES
1	Sort Code	PIC'9999'	4
2	Customer Identifier	CHAR(20)	20
3	Channel	PIC'9'	1
4	Start Time	PIC'(10)9'	10
5	Stop Time	PIC'(10)9'	10
6	Intervals-Per-Hour	PIC'99'	2
7	Unit of Measure	PIC'99'	2
8	Alternate Format 0-Second Header 1-Third Header	PIC'9'	1
9	Filler	CHAR(30)	30

A cut's pulse multiplier may be written out in one of two formats. The format chosen depends on the value of the pulse multiplier, and is selected automatically by the program. If the value of the pulse multiplier is *greater than (0.99999),* then the *alternate format flag* of the First Header record (see Table 16-5) is *set to "0"* and the *pulse multiplier is inserted in element 5 of the Second Header record* (see Table 16-6). However, if the value of the pulse multiplier is *less than (1.000),* then the *alternate format flag is set to "1"* and the *pulse multiplier is placed in element 3 of the Third Header record* (see Table 16-7). The *primary format for the pulse multiplier accommodates values in the range of 1.000 to 9999999999.99999. The secondary format covers the range from 0.000000000000001 to 0.999999999999999.*

Table 16-6: Second Header Record Format

ELEMENT	DESCRIPTION	ATTRIBUTES	LENGTH IN BYTES
1	Sort Code	PIC'9999'	4
2	Meter Start Reading	PIC'(6)9V9'	7
3	Meter Stop Reading	PIC'(6)9V9'	7

Table 16-6: Second Header Record Format

ELEMENT	DESCRIPTION	ATTRIBUTES	LENGTH IN BYTES
4	Meter Multiplier	PIC‘(10)9V(5)9’	15
5	Pulse Multiplier (≥ 1.0)	PIC‘(10)9V(5)9’	15
6	Meter Offset	PIC‘S(10)9V(5)9’	16
7	Pulse Offset	PIC‘S(10)9V(5)9’	16

Table 16-7: Third Header Record Format

ELEMENT	DESCRIPTION	ATTRIBUTES	LENGTH IN BYTES
1	Sort Code	PIC‘9999’	4
2	Descriptor	CHAR(40)	40
3	Alternate Pulse Multiplier (<1.0)	PIC‘V(15)9’	15
4	Population	PIC‘(9)9’	9
5	Weight	PIC‘(7)9V(5)9’	12

Table 16-8: Fourth Header Record Format

ELEMENT	DESCRIPTION	ATTRIBUTES	LENGTH IN BYTES
1	Sort Code	PIC‘9999’	4
2	Descriptor	CHAR(40)	40
3	Filler	CHAR(36)	36

Table 16-9: Standard Data Record Format

ELEMENT	DESCRIPTION	ATTRIBUTES	LENGTH IN BYTES
1	Sort Code	PIC‘9999’	4
2	Interval(12)	PIC‘99999’	(12) * 6
	Load Data Array	CHAR(5)	5
	Status Array	CHAR(1)	1
3	Filler	CHAR(4)	4

Daily Output Format

This section describes the format of the Daily Energy output (created by the DAIly command).

Character Daily Energy Format

The character Daily Energy format of the data records is shown in the table below.

Table 16-10: Character Daily Energy Data Record Format

CUSTID
CHANNEL
DATA DATE
IPD OCCURENCES OF: INTERVAL DATA
IPD OCCURENCES OF: INTERVAL STATUS

Statistical Package Interface Program (X710, Y710)

These programs are used to output load data or statistics from the ALDB or CLDB (X710) or ELDB (Y710) in a format that can be read directly by external applications that can be used for regression analysis and custom reporting. You can output individual cuts, cut series, or subsets of a cut series. The data is output in two files.

The first file is a matrix whose columns correspond to the selected cuts and whose rows correspond to observations in time. The second file contains header records with descriptive information about each cut in the matrix (such as customer-id, channel-number, start-time, etc.).

The program writes both files to a temporary data set that can be read directly by external applications.

Steps for Using the Statistical Package Interface Program (X710, Y710)

Here is a brief list of the steps you will follow when using the Statistical Package Interface Program to output load data and/or statistics from the CLDB or ELDB. These steps are described in detail on the following pages.

Table 17:

Summary — Using the Statistical Package Interface Program
1. Verify that the data you wish to output is in the source database(s).
2. Create the Statistical Package Interface Control File (TGY71A.CTL).
3. Create the Statistical Package Interface Environment File (TGY71B.ENV).
4. Run the program (X710 for the CLDB; Y710 for the ELDB).
5. Check output.

Figure 15-9: Statistical Package Interface Program summarizes the inputs you must provide and the outputs you can expect.

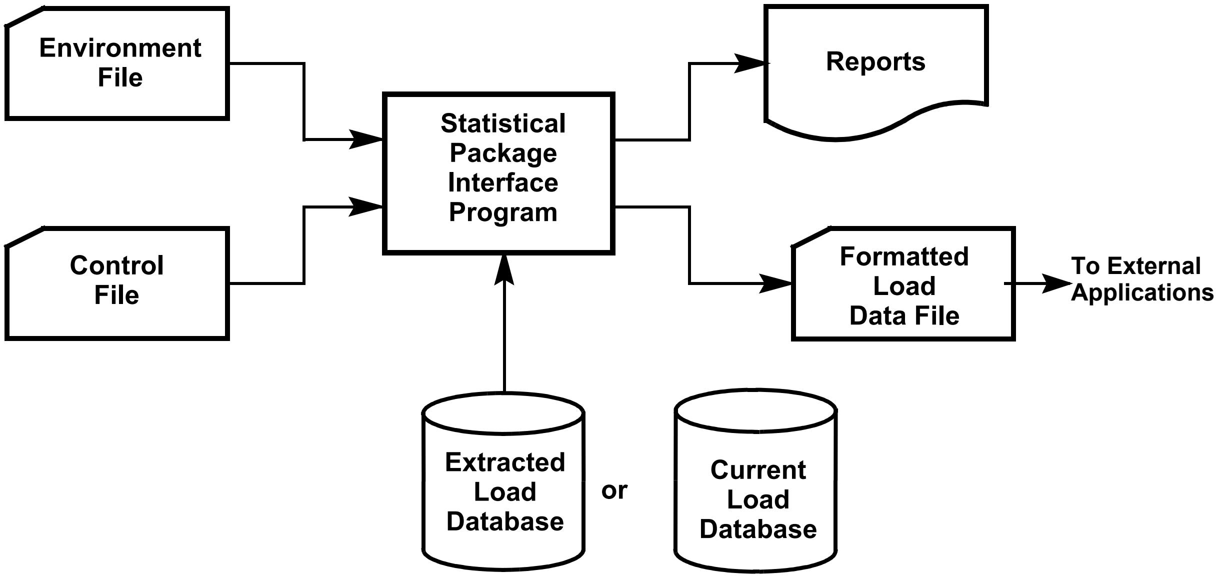


Figure 15-9 Statistical Package Interface Program

Step 1: Verify that the Data you wish to Output is in the Source Database(s)

In a single run, you can output data from just one database — either the CLDB or the ELDB.

Step 2: Create the Statistical Package Interface Control File (TGY71A.CTL)

The Control File contains the keys of load data records and/or statistics that you want to output, along with an optional parameter. The format for each Control File record is shown in the box below (Figure 15-10: Sample Statistical Package Interface Control File).

If you intend to output data from either the ALDB or the SLDB, the keys must be specified in ascending order.

You can include up to 500 records in a Control File.

```
B0001, 1                              /* KEYS FOR OUTPUT
F3290, 1
F3290, 2
STAR-ENTR-MEAN, 0, CLA
```

Figure 15-10 Sample Statistical Package Interface Control File

```
customer-id, channel [,start-time] [,CLAss]
```

- **customer-id, channel-number** (*required)* — enter the Oracle Utilities Load Analysis customer-id, channel-number for load data records, or the statistic-id, stratum-number for statistics.
- **start-time** — supply the cut's start time if you want to output interval data for the recording period of the cut. If you want instead to output interval data for a cut series (merged cuts) over a different date range, omit the start-time here and specify the date range using the Date Command in the Environment File.

  If you supply a Date Command in the Environment File *and* a start-time in the Control File, then the start-time will override the Date Command for the specified cut. *The output cut length in the matrix is still determined by the start- and stop-dates in the Date Command.* For instance, suppose the start- and stop-dates in the Date Command are 06/01/91 and 07/31/91, the cut's full key is N1200, 1, 06/15/91-15:00:00, and the cut series for this key includes data through the end of August. When this cut's data is output, it will start at 06/15/98-15:00:00 and will have a length of 61 days. Therefore, its stop-time will correspond to 08/15/98-14:59:59, 61 days after the cut's start-time.

If less data is available than that specified, the missing intervals in the output matrix will be assigned the value -9999.0. If no data is available, the run will be aborted.

> **Note:** If you wish to output invalid data from the CLDB, you must specify the start-time of the cut. (That is, invalid data cannot be merged into a cut series; therefore, you can only output it as individual cuts.)

- **Class** (*optional*) — this parameter is used to scale analysis statistics (sample mean and variance of the mean) to the class level (class total and variance). If you do not specify this option, the analysis statistics will be reported at the level at which they were originally written.

  > **Important Note:** If you specify the Class option for an "ineligible" record, the program will consider it an error. In that case, the program will not extract the record, but will alert you with a diagnostic message in the Execution Log. ***In other words, you can apply the Class option only to analysis statistics cuts whose identifiers include one of the following: MEAN, SExx,***

xMEN. Load data records, records whose source is the CLDB, and analysis statistics cuts with other IDs are all considered ineligible.

Step 3: Create the Statistical Package Interface Environment File (TGY71B.ENV)

The Environment File describes the source database, date range, and other data selection characteristics. The commands are summarized in Figure 15-11: Format of the Statistical Package Interface Environment File. An example is provided in Figure 15-12: Sample Statistical Package Interface Environment File. When creating the file, enter one command per line. Each line must begin with the command name (keyword), but you need enter only the first three letters of the keyword. You may enter the commands in any order. If you do not specify a command, the program will assume the default (underlined).

DATe *start-time stop-time*

AGGregate [*n* | <u>3600</u>]

MERge [YES | <u>NO</u>**]**

QUAlity [‘*q*’ | ‘<u>8</u>’]

SOUrce {**CLDB** | **ELDB**}

Figure 15-11 Format of the Statistical Package Interface Environment File

Following is a detailed description of each command.

DATe *start-time stop-time*

- **Date** (*required*) — Establishes the period spanned by each of the cuts; i.e., the number of rows of the data matrix. You must use the format “mm/dd/yy” or “mmddyy”. (The dates always consist of whole days; i.e., the period always begins at 00:00:00 and ends at 23:59:59.) *The period spanned should not exceed one year for 3600-second data, or three months for 900-second data.* If not enough data is available to complete the specified period, the missing data will be assigned the value -9999.0.

  Note: You can override the date range for individual cuts by supplying a start-time in the Control File.

AGGregate [*n* | <u>3600</u>]

- **Aggregate** (*optional*) — Input “n” to establish the number of seconds-per-interval for the output data; 60, 300, 900, 1800, and 3600 are permitted values and 350,000 is the maximum.

  Where possible, Oracle Utilities Load Analysis will aggregate each customer’s load data to the specified level. If the interval length of a customer’s data exceeds the value you input, Oracle Utilities Load Analysis will treat that customer as missing.

  Note: Depending upon the type of data, the program will either *sum* or *average* the intervals. The aggregation method used by Oracle Utilities Load Analysis for each UOM is noted in *Appendix J: Oracle Utilities Unit of Measure Codes*.

MERge [YES | <u>NO</u>**]**

- **Merge**— An optional command. When set to “YES”, the program will merge all cuts found within the specified date range regardless of validation status. When set to “NO” (default), the program will reject invalid cuts and return an error message indicating the cuts are not merge-able.

QUAlity [‘*q*’ | ‘8’]

- **Quality** (*optional*) — Use this command to “filter” the output interval data by quality. Input the worst acceptable status code. Any data with a status code worse than ‘q’ will be reset to missing; i.e., assigned a value of -9999.0. The default is ‘8’ (only non-missing data is output).

  You **must** enclose the QUAlity parameter in apostrophes (‘ ’).

  > **Note:** You can find a list of Oracle Utilities status codes in *Chapter 3: The Oracle Utilities Load Analysis Data Formats* and in the *Oracle Utilities Load Analysis Quick Reference Guide.*

SOUrce {**CLDB** | **ELDB**}

- **Source** (*required*) — Use this command to specify the database from which the data will be written — *either* the CLDB or the ELDB.

```
DATE        12/01/00 12/31/00    /* AGGREGATE 12/00
AGG         3600                 /* DATA TO 3600 SPI IF
QUALITY     ‘L’                  /* QUALITY ‘L’ OR BETTER
SOURCE      ELDB                 /* EXTRACTED LOAD DATABASE
```

Figure 15-12 Sample Statistical Package Interface Environment File

Step 4: Run the Program (X710, Y710)

Once you have created the necessary input files, you are ready to run the program. Use X710 or Y710.

Statistical Package Interface Processing

The Statistical Package Interface Program accesses the cuts indicated in the Control File and shapes the data to match the parameters specified in the Environment File. If a cut’s full key is used, the start-time of the cut will override the start-date in the DATE Command of the Environment File. An Execution Log and two output files are produced.

The period of the output data is, to a large extent, independent of how the cuts actually appear on the Extracted Load Database. If a customer’s data happens to span more than one cut, or if the cut is longer than the interface period, only the data that matches the interface period is actually output. *If less data is available than indicated, the missing intervals in the matrix are assigned the value -9999.0. If no data is available, the run is aborted.*

```
DATE        12/01/00 12/31/00    /* AGGREGATE 12/00
AGG         3600                 /* DATA TO 3600 SPI IF
QUALITY     ‘L’                  /* QUALITY ‘L’ OR BETTER
SOURCE      ELDB                 /* EXTRACTED LOAD DATABASE
```

If a cut's full key is included in the Control File, the cut's start-time will override the start-date in the Environment File in determining the actual data output. *The output cut length in the matrix is still determined by the start- and stop-dates in the DATE Command.*

Any cut's data that falls below the quality level specified in the QUALITY Command will be reset to missing data; i.e., assigned a value of -9990.0.

Step 5: Check Output

The Statistical Package Interface Program produces five outputs, as summarized below and illustrated on the following pages.

- **Statistical Package Interface Environment Report** — reports back processing parameters specified in the Environment File.
- **Statistical Package Interface Execution Log** — lists requested cuts as well as their processing status. Errors associated with the Control File will appear in this report.
- **Statistical Package Interface Summary Report** — contains a set of statistics summarizing the results of the execution of the program, including the number of cuts extracted, the number of requests not satisfied, and the number of errors encountered.
- **Formatted Data Matrix** — a sequential file containing a date record followed by data records. The date record contains the start-dates of the data. Each row of the data matrix is written as a single data record containing up to 500 full-word (eight bytes), floating-point numbers. Each number represents a data interval from a cut in *energy* form. The number of values in each row varies from 1 to 500. The records are variable length, depending on the number of requests made in the Control File. The layout of this file is:

  ```
  DCL MATRIX(288,#CUTS)FLOAT BIN(53) CTL;
  ```

  > **Note:** The MATRIX file for Oracle Utilities Load Analysis Release 8.0 and later should be created using TYPE(VARLS).

  TYPE(VARLS) will create an output where carriage return and line feed characters are not generated as line separators. The output records will therefore run together. Instead of line separators, a binary 2-byte length field will be appended to the start of each record. SAS can read each record by reading the first two bytes to get the length, then reading the next number of bytes as indicated. The 2-byte length field is equivalent to the PL/1 data type 'fixed binary(15)'.

  > **Note:** In addition to the binary matrix file, the program also creates a character format matrix file (known to the system as tgy713) containing the same output. This file is comma delimited and any floating point data will be represented by eight digits with the decimal point appropriately located. The name for this new character format matrix file is the same as for the binary matrix file, but with '_char' appended to the end. For example, if the binary matrix file is named MATRIX10, the corresponding character format matrix file will be named MATRIX10_CHAR.

- **Header Variable File** — the header records correspond to the columns in the matrix. The layout of this file is:

  ```
  DCL 1 HEADER  UNALIGNED,  /* LRECL = 212 */
            2 CUT_ID                CHAR(7),
            2 CUST_ID               CHAR(64),
            2 CHANNEL               FIXED BIN(15),
            2 START_TIME,
              3 JULIAN              FIXED BIN(31),
  ```

```
  3 HOUR                  FIXED BIN(31),
  3 MINUTE                FIXED BIN(31),
  3 SECOND                FIXED BIN(31),
2 STOP_TIME,
  3 JULIAN                FIXED BIN(31),
  3 HOUR                  FIXED BIN(31),
  3 MINUTE                FIXED BIN(31),
  3 SECOND                FIXED BIN(31),
2 SECONDS_PER_INTERVAL    FIXED BIN(31),
2 TOTAL_INTERVALS         FIXED BIN(31),
2 DESCRIPTOR              CHAR(80),
2 UOM                     FIXED BIN(15),
2 STAT_FLAG               CHAR(1),
2 POPULATION              FLOAT DEC(6),
2 WEIGHT                  FLOAT DEC(6),
2 FILLER                  CHAR(8);
```

The Header Variable file contains the following variables:

- Cut-id, indicating the number of the corresponding column in the matrix
- Customer-id
- Channel
- Start-time, Julian date
- Start hour
- Start minute
- Start second
- Stop-time, Julian date
- Stop hour
- Stop minute
- Stop second
- Seconds per interval
- Total intervals
- Descriptor field
- Unit of measure
- Statistics flag, indicating whether a record is a statistic or not. A value of '1' in this field indicates a statistic; a value of '0' represents a non-statistic
- Population, for statistical records only
- Weight, for statistical records only.

  Note: In addition to the binary header file, the program also creates a character format header file (known to the system as tgy714) containing the same output. This file is comma delimited and any floating point data will be represented by eight digits with the decimal point appropriately located. The name for this new character format header file is the same as for the binary header file, but with '_char' appended to the end. For example, if the binary header file is named

HEADER10, the corresponding character format header file will be named HEADER10_CHAR.

Statistic Extraction Program (Y780)

The Statistic Extraction Program extracts specified cuts or statistics over multiple analysis rate classes over multiple analysis periods. The statistics are extracted into a CSV file that can be imported into a spreadsheet or reporting tool.

Steps for Using the Statistic Extraction Program (Y780)

Here is a brief list of the steps you will follow when using the Statistic Extraction Program to output statistics from the CLDB, ALDB, ELDB, or SLDB. These steps are described in detail on the following pages.

Table 18:

Summary — Using the Statistic Extraction Program
1. Verify that the data you wish to output is in the source tableset(s).
2. Create the Statistic Extraction Control File.
3. Create the Statistic Extraction Environment File.
4. Run the program (Y780).
5. Check output.

Figure 15-13: Statistic Extraction Program summarizes the inputs you must provide and the outputs you can expect.

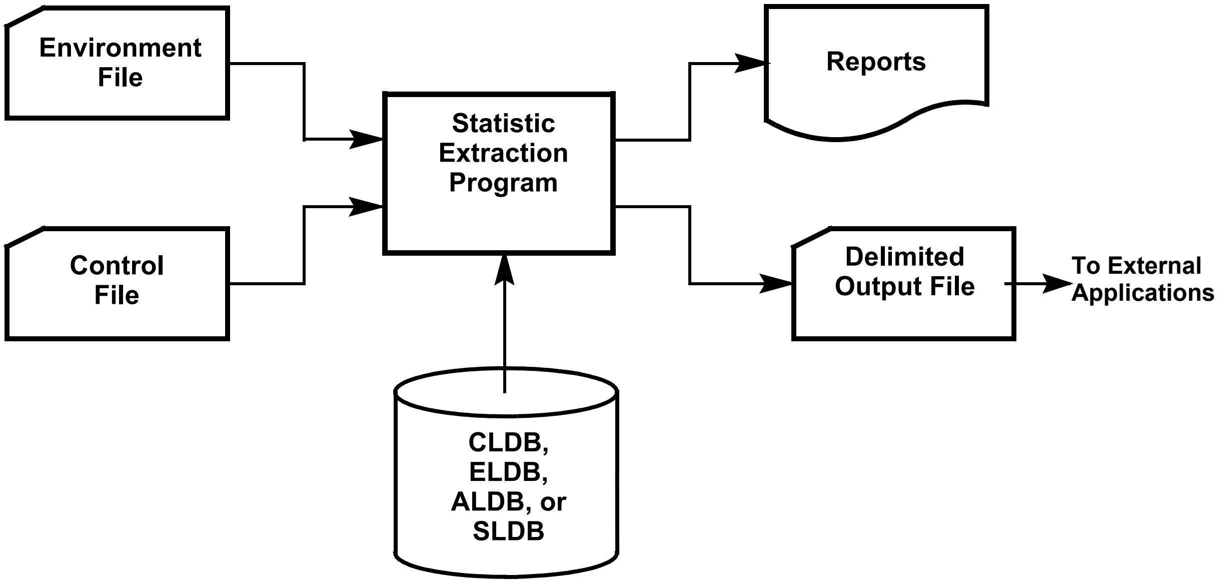


Figure 15-13 Statistic Extraction Program

Step 1: Verify that the Data you wish to Output is in the Source Tableset(s)

In a single run, you can output data from any of the following databases — CLDB, ALDB, ELDB, or the SLDB.

Step 2: Create the Statistic Extraction Control File

The Control File contains the keys of load data records and/or statistics that you want to output, along with optional parameters. The format for each Control File record is as follows:

```
<statistic-id> <stratum>  [label]  [period]              [CLAss]
                                   [totalize-method]
                                   [PKDate]
```

Example of Statistic Extraction Control File:

```
LODE-CD-CMEN, 0
LODE-CD-CMEN, 0, 'RESIDENTIAL'
LODE-CD-CMEN, 0, 'RESIDENTIAL', TOU1
LODE-CD-CMEN, 0, 'RESIDENTIAL', TOU1, CLA
```

- **Statistic ID** — Specifies the name of the statistic to extract data from. This is the Recorder ID or Customer ID of the requested cut in the tableset.
- **Stratum** — Specifies the stratum of the statistic to extract. This may also be a channel number.

    The combination of Customer ID and Channel or Statistic ID and Stratum will be used as a defaulted row header. The two fields will be separated by a comma.

- **Label** (*optional*) — Specifies a label to use in place of the ID, channel-stratum for each row header. The label must be enclosed in single, straight quotes.
- **Period** (*optional*) — For statistics that contain values for different periods, this option specifies which period type to extract. This value will override the default period established in the ENV file just for the request containing the command. Valid period types are as follows:
    - ENT (Entire Period)
    - TOUn (Time of use Period n)
    - PEAn (Supplied Peak Period n)
- **Totalize-method** (*optional*) — For interval data or time-series based statistics or cuts (for example, entire-period, or average day), use this option to specify the totalizing method to use. This value will override the default method established in the environment file. Valid totalizing methods are as follows:
    - SUM (Sum of interval values)
    - AVG (Average of interval values)
    - MAX (Maximum interval value)
    - MIN (Minimum interval value)

    The calculations for these will include zeros and will treat missing values as zeros.

- **PKDate** (*optional*) — For statistics that contain peak dates, specify **"PKD"** or "PKDATE" to extract the peak date-time from the statistic instead of its usage value. Peak dates can be extracted from the following statistics:

Table 16-1:

Peak Date Type	Statistic-key	Statistic Description
Group Peak	-MXEN-	Day of class peak statistic for entire period.
Group Minimum	-MNEN-	Day of class minimum for entire period.
TOU Peak	-MXTnn-	Day of class peak statistic for TOU period nn.
TOU Minimum	-MNTnn-	Day of class minimum for TOU period nn.
Supplied Peak	-MXPnn-	Day of supplied peak nn statistic.

Examples:

```
LODE-MXEN-CMEN,  0, 'GROUP PEAK',  PKDATE
LODE-MXP01-CMEN, 0, 'SYSTEM PEAK', PKDATE
```

- **Class** (*optional*) — Specifies whether or not to raise the statistic to the Class level. If specified, the statistic will be raised to the class level by multiplying its value by the population. If expansion to the class level is not possible due to the request not being a valid statistic with a valid value in its "population" field, the program will ignore the request and treat the request as "Not Applicable".

Step 3: Create the Statistic Extraction Environment File

The following table shows an example environment file for the Statistic Extraction Program:

TTL *title*

CLAss

DECimal *digits*

PERiod *period type*

TOTalize *totalize method*

ROW *value, label*

COL *value, label*

AGGregate *spi*

DATe *start-time Label*

ZERoes

DELimiter *period type*

Figure 15-14 Format of the Statistic Extraction Environment File

Following is a detailed description of each command.

TTL *title*

- **TTL** (*optional*) — This parameter specifies an optional title row in the output file. The title row will be inserted as the first record in the output file.

  Example:

  ```
  TTL RESIDENTIALS FOR YEAR 2012
  ```

CLAss

- **CLAss** (*optional*) — This parameter specifies whether or not to raise all statistics to the Class level. If specified, all statistics will be raised to the class level by multiplying its value by the population if applicable.

DECimal *digits*

- **DECimal** (*optional*) — This parameter specifies the number of decimal digits, from 1 to 9, to which output values should be formatted. By default, values are formatted to 4 decimal digits.

  Example:

  ```
  DECIMAL 2
  ```

PERiod *period type*

- **PERiod** (*optional*) — For statistics that contain values for different time of use periods, use this option to specify the default period type to extract. Default is ENT (Entire Period). Valid period types are as follows:

- ENT (Entire Period)
- TOUn (Time of use Period n)
- PEAn (Supplied Peak Period n)

Example:

```
PERIOD ENT
PERIOD TOU1
```

TOTalize *totalize method*

- **TOTalize** (*optional*) — For interval data or time-series based statistics (for example, entire-period or average day), this option specifies the mathematical method used for combining intervals. Valid types are as follows:
  - SUM (Sum of interval values - Defaulted value)
  - AVG (Average of interval values)
  - MAX (Maximum interval value)
  - MIN (Minimum interval value)

  Example:

```
TOTALIZE SUM
TOTALIZE MAX
```

ROW *value, label*

- **ROW** (*optional*) — This parameter is used to insert an additional summary value at the end of each row containing row totals or averages. This command can be repeated to produce summary values for all value types.

  “Value” specifies the value type for this row. Valid value types are TOTal and AVErage.

  “Label” specifies a header label to use for this row. Default is “TOTAL” or “AVERAGE”, depending on value type. If specified, label must be enclosed in single, straight quotes.

  Example:

```
ROW TOT 'GRAND TOTAL'
```

COL v*alue, label*

- **COL** (*optional*) — This parameter is used to insert an additional summary value at the end of each column containing column totals or averages. This command can be repeated to produce summary values for all value types. Valid value types are TOTal and AVErage

  “Label” (optional) specifies a header label to use for this column. Default is “TOTAL” or “AVERAGE”, depending on value type. If specified, label must be enclosed in single straight quotes.

  Example:

```
COL TOT 'GRAND TOTAL'
```

AGGregate *spi*

- **AGGregate** (*optional*) — This parameter establishes the number of seconds-per-interval to scale the output data to. Aggregation is only applied to interval data and time-series based data. Statistic records that do not represent interval data will be ignored. Valid values are 60, 300, 900, 1800, 3600, and 86400.

  Example:

  ```
  AGG 3600
  ```

DATe *start-time Label*

- **DATe** — Each DAT command creates a column entry in the output file. At least one DAT command entry is required. The maximum number of DAT commands allowed is 200.

  Specify the start-time (analysis start periods) from which to extract statistics. The start-time, combined with statistics-id and stratum from the control file, determines which statistic record to retrieve and extract.

  "Label" (optional) specifies a column header. If this header is not supplied the start-time value will be used. If specified, label must be enclosed in single straight quotes.

  Example:

  ```
  DAT 01/01/12-00:00:00 'JAN'
  ```

ZERoes

- **ZERoes** — By default, any data that is not extracted or not found will have a blank value as an output. The ZERoes parameter specifies that a zero value (0.0) is extracted in place of a blank value.

DELimiter *value*

- **DELimiter** (*optional*) — This parameter specifies the field delimiter character to be used in the output format file. The default delimiter is comma (",").

Sample Statistic Environment File

```
/* PROGRAM CREATES A CSV FILE
/*
/* RAISE TO CLA LEVEL DO NOT BLOW UP IF CANNOT RAISE TO CLASS LEVEL
CLA
AGG 3600

/* COLUMN/ROW SUMMATIONS AND/OR TOTALS - APPENDED TO LAST COLUMNS/ROWS
ROW AVG 'AVERAGE' /* AVERAGE ROW ADDED
ROW TOT 'TOTAL' /* TOTAL ROW ADDED
COL AVG 'AVERAGE' /* AVERAGE COLUMN ADDED
COL TOT 'TOTAL' /* TOTAL COLUMN ADDED

/* STATISTIC TO GO AFTER - TOT AND ON ARE FOR TIME SERIES TYPE OF CUTS
/* STATISTIC ENT|[TOU1|TOUN]|[PEA1|PEAN]
PER TOU1

/* CREATE THESE COLUMNS: (MAX 200)
DAT 01/01/12-00:00:00 'JAN'
DAT 02/01/12-00:00:00 'FEB'
DAT 03/01/12-00:00:00 'MAR'
DAT 04/01/12-00:00:00 'APR'
DAT 05/01/12-00:00:00 'MAY'
```

```
DAT 06/01/12-00:00:00 'JUN'
DAT 07/01/12-00:00:00 'JUL'
DAT 08/01/12-00:00:00 'AUG'
DAT 09/01/12-00:00:00 'SEP'
DAT 10/01/12-00:00:00 'OCT'
DAT 11/01/12-00:00:00 'NOV'
DAT 12/01/12-00:00:00 'DEC'

ZEROES
DELIMITER ','
```

Step 4: Run the Program (Y780)

Once you have created the necessary input files, you are ready to run the program. Use Y780.

Statistic Extraction Processing

The program will read the environment file to establish run parameters. Any errors will halt the run and will be reported to the user in the Report.html file with a non-zero return code. The program will then read each line of the control file, overriding any environment file commands supplied for that request, read the specified tableset for the statistic or cut, then extract the data into the output file. If successful the program will return a zero return code.

Step 5: Check Output

The Statistical Package Interface Program produces a report detailing the run execution, and a delimited file which may then be used for reporting purposes.

Chapter 17

Housekeeping (Y910 and Y960)

Oracle Utilities Load Analysis includes a number of database maintenance programs that may be performed as production processes by your System Administrator. This chapter includes a quick summary of these programs.

This chapter explains a few of the many programs Oracle Utilities Load Analysis provides for database maintenance. With these programs, you can make copies of the ELDB to protect your work, as well as move cuts from the ELDB to the SLDB and back. Programs described in this chapter include:

- **Steps for Using the Archive/Delete Program (Y910)**
- **Steps for Using the SLDB Retrieval Program (Y960)**

Oracle Utilities Load Analysis includes various database maintenance programs that enable you to remove records from the ELDB, archive them to the "Statistics Load Database" ("SLDB"), and copy them back to the ELDB. Here is a summary of a few of the Oracle Utilities Load Analysis "housekeeping" or database maintenance programs.

Name	Application
Archive/Delete (Y910)	Transfers cuts from the ELDB to the SLDB; deletes them from the ELDB
SLDB Retrieval (Y960)	Copies cuts from the SLDB back to the ELDB, allowing you to re-examine and revise them if necessary

This chapter emphasizes the procedures you will probably use most often:
Archive/Delete and **Retrieval**.

It is a very good idea to establish a routine for archiving data from the ELDB to the SLDB, both in terms of when the procedure is performed and what kinds of data are preserved. Some utilities archive all statistics, but save only the load data that has been changed. It is also common for utilities to archive all monthly or yearly statistics, while others save only statistics that have been used in a rate case.

> **Note:** It is also important that you or your I.T. staff periodically perform backup on the Interval Database (frequency will depend on the volume of work). This helps minimize the amount of work lost in case of a hardware or software malfunction.

Steps for Using the Archive/Delete Program (Y910)

This program (Figure 16-1: Archive/Delete Program and ELDB Backup) enables you to move selected cuts (statistics and/or load data records) from the ELDB to the SLDB, deleting the transferred data from the ELDB.

> You should back up the ELDB before running the Archive/Delete Program. This backup can be used to recover the ELDB in case there is a user error or a system malfunction.

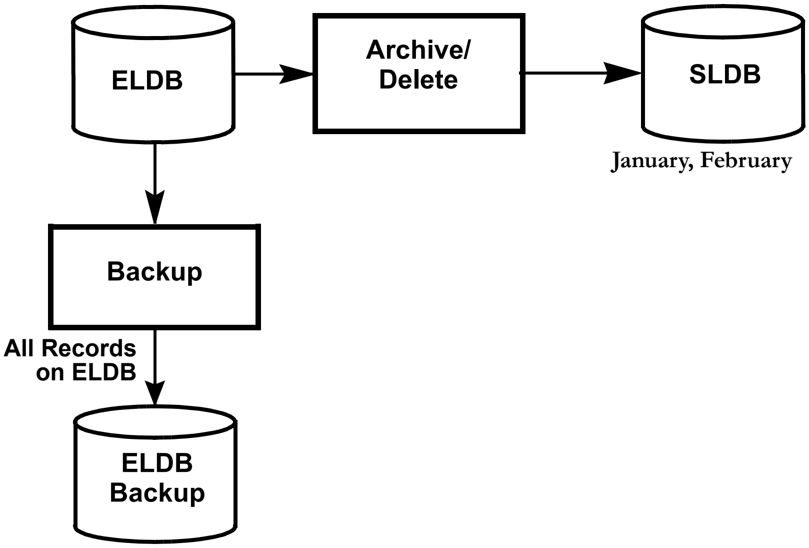


Figure 16-1 Archive/Delete Program and ELDB Backup

Summary – Using the Archive/Delete Program
1. Create Key Generator Control File (TGY11A.CTL) or Archive/Delete Control File (TGX92A.CTL).
2. Run Archive/Delete (Y910).
3. Check and KEEP output.
4. **NOTE:** It is CRITICAL that you keep the output.
5. (If malfunction occurs) Restore ELDB and start over with Step 2.

Note: An alternative to this process is to use the Q91M Move Cuts programs with the embedded key generator for the control file.

Step 1: Create Key Generator (TGY11A.CTL) or Archive/Delete Control File (TGX92A.CTL)

The Archive/Delete Control File is normally created by the ELDB or SLDB Key Generator Programs as the first step of the Archive/Delete procedure. The Key Generator creates a list of keys of cuts to be transferred to the SLDB. ***Note:*** *Keep in mind that when you transfer cuts to the SLDB, the transferred cuts will automatically replace any old cuts in the SLDB that have the same cut key.*

The format of each key is:

For load data:

customer-id, *channel-number*, *start-time*

For statistics:

statistic-name, *strata-number*, *start-time*

This file is created by the Key Generator, which is run prior to the archive program.

Step 2: Run Archive/Delete (Y910)

Once you have created the Control File, you are ready to run the program. Use Y910.

Archive/Delete Processing

The Archive/Delete process usually includes two programs:

1. Key Generator

   The ELDB or SLDB Key Generator is used to create a list of keys to be transferred and/or deleted. See *Chapter 14*: *Key Generators — Shortcuts for Creating Input Files and Reports* for a discussion of Key Generator processing.

2. Archive/Delete

   The Archive/Delete Program is used to transfer and/or delete the above cuts.

   If an archived cut already exists in the SLDB (i.e., if a cut has been returned to the ELDB via the Archive Retrieval Program and its key has not been modified), *the transferred* ELDB *record will replace the existing one in the* SLDB.

   Note: To delete records off the SLDB, run the Delete Cuts Program.

Step 3: Check and KEEP Output

It is critically important that you keep the output reports. Remember, this procedure deletes cuts from the database. These reports provide a record of what was deleted and when.

At the end of its run, the Archive/Delete Program produces the following reports:

- **Archive/Delete Environment Report**
- **Archive/Delete Execution Log**
- **Archive/Delete Summary Log.**

Step 4: ELDB Recovery (If Malfunction Occurs)

If there was a malfunction during Archive/Delete, it is important that you restore the ELDB and start over. Restore the ELDB, then start over with Step 2.

Steps for Using the SLDB Retrieval Program (Y960)

This procedure enables you to copy specified cuts in the SLDB and return them to the ELDB, so that you can reexamine and revise them if necessary. The cuts in the SLDB are unaffected by the Retrieval Program.

If you request a cut that already exists in the ELDB, Oracle Utilities Load Analysis will reject the request.

Summary — Using the SLDB Retrieval Program

1. Create the Retrieval Control File (TGX66A) – a list of cuts to be retrieved.
2. Create the Retrieval Environment File.
3. Run Retrieval Program (Y960).

   Note: The Environment File does not require modification.

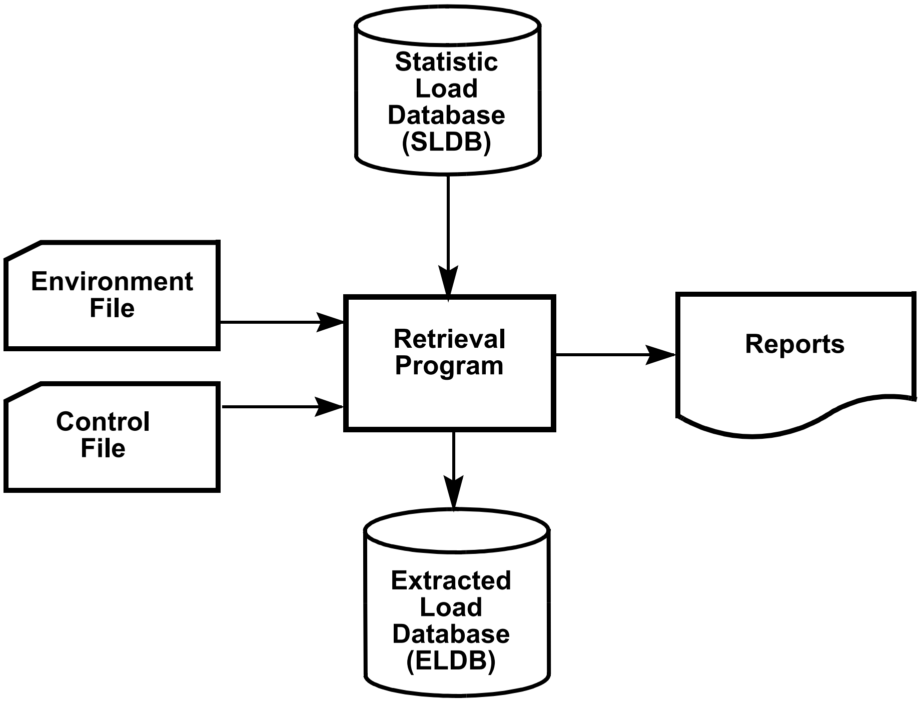

Statistic Load Database (SLDB)
Environment File
Control File
Retrieval Program
Reports
Extracted Load Database (ELDB)

Figure 16-7 SLDB Retrieval Program

Step 1: Create the Retrieval Control File (TGX66A.CTL)

The Control File is a list of the cuts you want to retrieve from the SLDB. You can enter just one request per line. Each request must be in this format:

For load data:

customer-id, *channel-number*, *start-time*

For statistics:

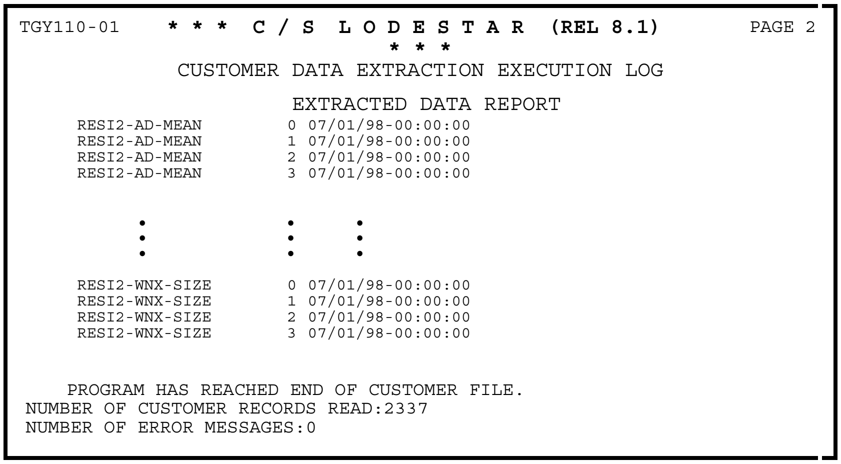
statistic-name, *strata-number*, *start-time*

You may use the Key Generator Program to create the list of keys (Figure 16-8: Sample Retrieval Control File created by the ELDB Key Generator).

Step 2: Create the Retrieval Environment File (TGX66B.ENV)

There are two Environment File commands for the Retrieval Program; SOUrce and FLAgs. The procedures delivered with Oracle Utilities Load Analysis refer to a pre-coded Environment File consisting only of the appropriate SOUrce Command.

See Figure 16-9: Sample Retrieval Environment File for a sample Environment File.



```
TGY110-01     * * *  C / S  L O D E S T A R  (REL 8.1)        PAGE 2
                                 * * *
                CUSTOMER DATA EXTRACTION EXECUTION LOG

                             EXTRACTED DATA REPORT
     RESI2-AD-MEAN         0 07/01/98-00:00:00
     RESI2-AD-MEAN         1 07/01/98-00:00:00
     RESI2-AD-MEAN         2 07/01/98-00:00:00
     RESI2-AD-MEAN         3 07/01/98-00:00:00


           .               .      .
           .               .      .
           .               .      .

     RESI2-WNX-SIZE        0 07/01/98-00:00:00
     RESI2-WNX-SIZE        1 07/01/98-00:00:00
     RESI2-WNX-SIZE        2 07/01/98-00:00:00
     RESI2-WNX-SIZE        3 07/01/98-00:00:00


    PROGRAM HAS REACHED END OF CUSTOMER FILE.
NUMBER OF CUSTOMER RECORDS READ:2337
NUMBER OF ERROR MESSAGES:0
```

Figure 16-8 Sample Retrieval Control File created by the ELDB Key Generator

SELect [**ALL** | **KEY**]

DATe [*start-time stop-time* | **ALL** | **ALL** *stop-time* | *start-time*]

FLAgs [**Nearest** | **RESet**]

Figure 16-9 Sample Retrieval Environment File

The **SEL**ect Command tells the program whether or not to process the Control File. SELect KEY, the default, instructs the program to retrieve only the Customer-ids listed in the Control File. The ALL option causes the program to loop through the entire database and select all the records that meet any of the other criteria set in the Environment File.

The **DAT**e Command is used to set the start- and stop-times of the retrieval period for the *selected cuts*. You define *selected cuts* using the Select Command described above — either all cuts in the database or just those listed in the Control File. The DATe Command is only optional when processing a control file. If SELect ALL is specified, you ***must*** supply the DATe Command as well; otherwise, the program will not run.

There are several ways to specify the retrieval period:

- If you specify just ALL, then all *selected cuts* will be retrieved, regardless of their start-time.
- If you supply both a start- and a stop-time, all *selected cuts* with intervals at or between the two times will be retrieved.
- If you supply just a start-time, all *selected cuts* with intervals at or after the specified start-time will be retrieved.
- If you specify ALL followed by a stop-time, the program will retrieve all *selected cuts* with intervals at or before the specified stop-time.

You will want to code the optional command **FLAgs** with NOR, only if you want the program to leave the Merge and Archive flags on the retrieved cuts unchanged from their status in the SLDB, rather than resetting them to “NO” (see above). The default is to reset the flags.

Step 3: Run the SLDB Retrieval Program

Submit the Y960 program.

Retrieval Processing

If a cut is found, the program will attempt to write the active record (inactive and edit trail records are not normally stored on the SLDB) for that cut to the ELDB. *If a cut being retrieved already exists on the ELDB, the retrieval request is rejected.*

Chapter 18

The Cut Series Gap Report Program (Y490 - Y491)

The Cut Series Gap Report lists, for each cut series (customer ID and channel), the start date and time of the series, any gaps in the data, and the stop date and time of the series. The report shows the start- and stop-times of each gap. A gap is defined both as a time period between the end of a cut and the beginning of the next cut in the series, and as a period of missing data (as defined by status codes) within a single cut. The Gap Report may be produced for all cut series in the ELDB or SLDB, or for a specified portion of the database. It reports on load data cuts and/or Entire Period statistics only.

The Gap Report can provide a quick check of the completeness of load data in your ELDB before running an Analysis Program. Also, if you have been running an Analysis Program periodically (each month, for example), you can use the Gap Report for a selected Entire Period statistic as a check that all such runs over a longer period were completed successfully.

Once you identify the cuts with gaps, you may elect to run the X310 Load Data Editor on the cut series to fix the gaps. Please refer to **Editing Data in the CLDB Using the Load Data Editor (X310 or X320)** on page 9-1 in *Oracle Utilities Load Analysis Load Data Analysis User's Guide,* and reference the EGAP Editor Command.

Steps for Using the Cut Series Gap Report Program

The following pages describe the steps for creating the Cut Series Gap Report Program using either the ELDB or SLDB Gap Report procedures.

Summary — Using the ELDB or SLDB Cut Series Gap Report Program (Y490, Y491)

1. Determine whether you want a report on the entire database or on selected records. If you want a report on the entire database, go to Step 3. If you want selected records only, create the Control File (TGX49A.CTL).
2. If you want to report data within a specified date range, or to report Entire Period statistics, create the Environment File (TGX49B.ENV).
3. Run the Cut Series Gap Report Program (Y490 for ELDB, Y491 for SLDB).

Step 1: Create the Control File (TGX49A.CTL) to Select Specific Cuts for Reporting

If you want to report the entire contents of the database, go to Step 3. The Control File (Figure 17-1: First Portion of a Sample Control File) is a list of the cuts and/or Entire Period statistics records you want to report. You can create the file manually, generate it with the Customer Data Extraction Program, or create it with the ELDB or SLDB Key Generator Program.

Each report request has the following format:

For Load Data Records

Customer-id, *channel-number*

Enter one request per line.

```
B022,  1
B024,  1
B025,  1
B027,  1
B028,  1
B029,  1
B030,  1
C050,  3




 LODE-ENTR-MEAN,0
```

Figure 17-1 First Portion of a Sample Control File

Step 2: Create the Environment File (TGX49B.ENV)

Use the Environment File to specify a date range. You can report on all cuts in the database that fall within that range or, if you supply a Control File, those portions of the specified cut series that fall within the date range.

Create the Environment File with these six commands:

DATe [*start-time stop time* | **ALL**]

SELect [**KEY** | **ALL**]

SOUrce {**ELDB** | **SLDB**} [STAtistics]

QUAlity [‘*q*’ | ‘8’]

PRInt [**GAP** | **ALL**]

TITle *optional-user-title*

- **Date** — Use this optional command to set the start- and stop-time of the reporting period for the *selected cuts*. You define “selected cuts” using the Select Command described below — either all cuts in the database, or just those listed in the Control File.

  There are several ways to specify the Reporting Period:

  - If you specify just “ALL”, then the selected cuts will be tested for gaps, regardless of their start-time. (This is the default.)
  - If you supply both a start-time and a stop-time, all selected cuts that contain intervals at or between the two times will be tested.
  - If you supply just a start-time, all selected cuts that contain intervals at or after the specified start-time will be tested.
  - If you specify “ALL” followed by a stop-time, the program will test all selected cuts that contain intervals at or before the specified stop-time.

  To specify a date/time, use the “mm/dd/yy-hh:mm:ss format. If you omit the hh:mm:ss portion, the start- and stop-times will default to 00:00:00 and 23:59:59, respectively.

- **Select** — Use this command to indicate which cut series you want reported. “ALL” indicates that you want every cut in the database that falls within the specified date range. “KEY” indicates that you want only those customers whose keys appear in the Control File to be reported. ALL is the default.

- **Source** — Use this command to identify which database you want the cuts reported from. This is a required command. You must input “ELDB” if you are using the ELDB Cut Series Gap Report Program, and “SLDB” if you are using the SLDB Cut Series Gap Report Program. Add the optional STAtistics parameter to report Entire Period statistics as well as load data cuts.

- **Quality** — Use this optional command to define what intervals within a cut will not be considered gap intervals. Input the worst acceptable status code. Oracle Utilities Load Analysis will treat any interval with a status code worse than **’q’** as missing, i.e., as constituting part of a gap. ***Note:*** The status code must be input with apostrophes (’) on either side. The default is **’8’** (only status **’9’** missing intervals constitute a gap or gaps within a cut).

- **Print** — Use this optional command to determine which of the tested cut series are to be reported. If you specify “PRInt GAP”, only cut series found to contain one or more gaps will be listed in the Cut Series Gap Report; all series without any gaps will be omitted from the report. If you specify “PRI ALL” or “PRI” (with no option), or if you omit this command, all tested cut series will be reported.

- **Title** — This command allows you to specify one additional title line on the Cut Series Gap Report and Gap Report Summary Log. The title begins with the first non blank character following the TITLE keyword, and may be up to 196 characters long; it is not enclosed in quotes.

Here is a sample Environment File for the ELDB Cut Series Gap Report Program.

```
DATE   ALL
SEL    KEY
SOU    ELDB  STA
TITLE GAPS IN LOAD DATA AND ENTIRE PERIOD STATISTICS
```

Figure 17-2 Sample Environment File

> **Note:** The example for the SLDB Cut Series Gap Report Program is identical, except “SOURCE SLDB” is used.

Use Y490 for the ELDB or Y491 for the SLDB.

Step 3: Run the Cut Series Gap Report Program

SLDB Summary Reporter Processing

When “SELECT ALL” mode is used, each cut series on the ELDB or SLDB that falls within the desired date range is reported.

In “SELECT KEY” mode, only those cuts whose keys appear in the Control File and are within the desired date range are reported. If a key is not found, an error message is generated and processing continues with the next Control File record.

Chapter 19

The Daytype Analysis Program (Y760 — Y770)

The **Daytype Analysis** Program produces 24-hour average hourly load profiles for up to 48 daytypes in a year. Up to four daytypes can be requested for a period of up to 12 months: Weekday, Weekend Day, Peak Day, and Nearpeak Day. The Daytype Analysis Program produces a report and an output file in a format for compatibility with non-Oracle Utilities Load Analysis modeling programs. The file contains a 24-hour load profile for each daytype and each calendar month or season. Multiple end-uses may be analyzed in each run. The program can also analyze statistic records written to the ELDB by analysis programs.

Data used in the analysis is extracted over the date range specified in the Environment File for each end-use (customer ID and channel) specified in the Control File, and is output as a report. If a statistic record is selected and it consists of multiple records over the date range, the records are merged; if the Class option is used, data from each of the merged records is scaled by the appropriate population factor. For each end-use or statistic, the output file consists of several header records followed by one data record per hour and month for each daytype requested. Two descriptive titles may be entered via the Environment File for inclusion in the header records. An additional description specific to each cut series, for use in the output record labeled "EE", may be entered via the Control File; if this option is not chosen, the program will use the customer ID, channel, number of calendar months or seasons analyzed, and abbreviations of the daytypes selected.

Input Preparation

The Daytype Analysis programs require five input files that define how to process load data to create typical day types:

- Control File — keys of end-use records
- Environment File — data sources and type
- Peak Days File — peak day definitions
- Holiday File — holiday definitions
- Season File — season definitions.

Control File (TGY76A.CTL)

The Control File contains the partial keys (customer ID, channel) of the Oracle Utilities Load Analysis end-use cuts or statistic records that are to be extracted from the database over the date range. The format for each Control File record is shown in the box below.

Analysis of statistic records is restricted to Mean- or Total-type statistics written by the Oracle Utilities Analysis programs for Entire Period only. The middle portion of the customer ID of all such records is -ENTR-, and the channel is always 0. The last part of the customer ID may be MEAN, RMEN, CMEN, SMEN, TOTL, or CTOT, depending on which Analysis program created the statistic.

You can include any number of records in a Control File.

customer-id, *channel* [,*optional 88-character title*]

Following the channel, the user may specify an optional 88-character title used in the “EE” record for the particular end-use. If no such title is entered, the default is made up of the customer ID, channel, number of months or seasons analyzed, and abbreviations of the daytypes created:

“EE” “CUSTOMER_A   ,1,12 MTH,WD,WN,P,NP”

Environment File (TGY76B.ENV)

The Environment File describes the source database, date range, and other data selection characteristics. The commands are summarized in the box below. When creating the file, enter one command per line. Each line must begin with the command name (keyword); but you need enter only the first three letters of the keywords. You may enter the commands in any order. If you do not specify a command, the program will assume the default (underlined).

DATe [*start-date*] [*stop-date*]

QUAlity [‘*q*’ | ‘8’]

REPort [**WD** | **WN** | **PK** | **NP** | **NONe** | **ALL**]

SEAson *n*

SOUrce {**CLDB** [**BOTH**] [2] | **ALDB** [2] | **ELDB** [**BOTH**] [2] | **SLDB** [2]}

TYPe [**WD** | **WN** | **PK** | **NP** | **NONe** | **ALL**]

TL1 [*optional 80-character title*]

TL2 [*optional 80-character title*]

MERge [YES | NO **| EXClude]**

The DATe, QUAlity, and SOUrce commands are used in the same way as they are used with the Direct Output Program.

DATe [*start-date*] [*stop-date*]

QUAlity [‘*q*’ | ‘8’]

SOUrce {**CLDB** [**BOTH**] [2] | **ALDB** [2] | **ELDB** [**BOTH**] [2] | **SLDB** [2]}

The **DATe** Command is *required*; it determines both the date range for which data will be extracted from the database, and the number of months for which daytype records will be written (unless season processing is selected). Only full days of data are used by the Daytype Analysis Program; hours, minutes, and seconds other than 00:00:00 (for a Start Time) and 23:59:59 (for a Stop Time) are ignored. The date range may not include more than 12 months of data or portions thereof. If any portion of a month is within the date range, output records will be written for that month in the case of a month that is only partially within the date range. For example, if the date range is 03/18/99 to 09/17/99, records will be written for the month of March using data from days 18 - 31, and for the month of September using data from days 1 - 17.

SEAson *n*

The **SEAson** Command specifies a positive integer representing a Season Schedule number in the Season File that is used to define season boundaries. If the SEAson Command is used, daytypes are created for each season rather than by month.

TYPe [**WD** | **WN** | **PK** | **NP** | **NONe** | **ALL**]

The **TYPe** Command determines what daytype records are written to the Daytype File for each month or season in the date range. The syntax is:

TYPe [WD] [WN] [PK] [NP]

or

TYPe [ALL]

WD indicates records are written for the Average Weekday in each month.

WN indicates Average Weekend day.

PK indicates Average Peak day.

NP indicates Average Nearpeak day.

The second form, Type NONE, of the command indicates that no daytypes are written; this option is used only if the daytype report is desired.

The third form, Type ALL, of the command indicates that all 4 daytypes are to be written for each month or season, which is the default if no TYPe Command is entered.

REPort [WD | WN | PK | NP | NONe | ALL]

The **REPort** Command determines which, if any, daytypes are included in the daytype report. The syntax and options are the same as for the TYPe Command.

TL1 [*optional 80-character title*]

TL2 [*optional 80-character title*]

The optional TL1 and TL2 commands allow the user to specify what titles are written in the first and second <eif> records, and on the daytype report for each end-use. The syntax is TL1 or TL2, followed by a free-form title up to 80 characters in length, including embedded blanks. A title longer than 80 characters is truncated.

If the TL1 Command is not used, the first line of the end-use block defaults to the following, which shows the date range that is specified in the Environment File (adjusted to full days if necessary):

<eif> "SYSITEM" "01/01/97-00:00:00 12/31/97-23:59:59"

If the TL2 Command is not used, the fourth line of the end-use block defaults to:

<eif> "EULOAD" "ENDUSE ACTUAL DEMAND"

MERge [YES | NO | EXClude]

The **Merge** command, when set to "YES", merges all cuts found within the specified date range regardless of validation status. When set to "NO" (default), the program will reject invalid cuts and return an error message indicating the cuts are not merge-able. When set to "EXClude", the program will merge all cuts found within the specified date range, but exclude all invalid data.

Peak Days File (TGY76C.PEA)

Each record in this file consists of a date in the form mm/dd/yy, followed by P, NP, or blanks. P or blanks designate the date as a Peak day; NP designates the date as a Nearpeak day.

Holiday File (TGY31C.HOL)

The program uses the standard Oracle Utilities Load Analysis Holiday File, which treats Holidays as Weekend days for this analysis. However, if a date in the Holiday File is also designated a Peak day or a Nearpeak day, the Peak/Nearpeak designation applies.

Season File (TGY31E.SEA)

The program uses the standard Oracle Utilities Load Analysis Season File. Each season is defined by a season number and name and by one or more start and stop dates. Noncontiguous season segments within the Daytype Analysis date range are combined for computation of each season's daytypes.

Processing Summary

The Daytype Analysis Program processes each entry in the Control File over the date range specified in the Environment File. It is designed to create a set of day types for each calendar month or season spanned by that date range.

Therefore, each month or season in the date range must contain at least one example of each daytype requested by the TYPE or REPORT Command, or of all four daytypes, if no TYPE or REPORT Command is specified. Every day in the date range is classified as belonging to a daytype as follows:

- If it is in the Peak Days file, it is classified as either a Peak day or a Nearpeak day
- If it is in the Holiday File and not in the Peak Day file, it is classified as a Weekend day
- All other days are classified as either Weekdays or Weekend days according to their day of the week.

Summary of Outputs

The program creates three reports and an output file, as follows:

- Environment File Report — summary of user options and defaults
- Execution Log Report — summary of processing for each Control File entry
- Daytype Report — daytype values for each end-use or statistic, in vertical columns, one page per month or season
- Daytype File — daytype values for each end-use or statistic in DSManager file format.

Daytype File (TGY761)

The output for each end-use or statistic (customer ID, channel) begins with five header records. The first contains the title specified in the TL1 Environment File command, or the default:

<eif> "SYSITEM" "01/01/99-00:00:00 12/31/99-23:59:59"

The second header record is constant:

"EE - ELECTRIC ENDUSE DATA"

The third header record contains the title entered in the Control File record for this end-use, or the default:

"EE" "P1810 ,1,12 MTH,WD,WN,P,NP"

The fourth header record contains the title specified in the TL1 Environment File command, or the default:

<eif> "EULOAD" "ENDUSE ACTUAL DEMAND"

The fifth header record is constant:

"DT#" "Hour" "actual demand"

Following the header records are a series of data records. Each data record contains the average demand for one hour of a particular daytype within a particular month or season. As suggested by the fifth header record, above, the data record consists of a daytype number, an hour of the day, and a demand figure.

The daytype number is assigned as follows:

- The first record for the first month or season is assigned the number 1
- All 24 hours of this daytype come next, with daytype number 1
- The next daytype for that month or season (if any) is assigned the number 2, and so forth
- The first record for the second month of season is assigned the next daytype number in sequence after the first month's or season's, etc.

Therefore, if all four daytypes are written, records for the first month or season are assigned daytype numbers 1 - 4, records for the second month or season are assigned daytype numbers 5 - 8, and so on.

Here is an example of a Daytype File for 4 daytypes over 2 months:

```
<eif> "SYSITEM" " 05/01/99-00:00:00 06/30/99-23:59:59"
"EE - ELECTRIC ENDUSE DATA"
"EE" "SAMP-CUST,1,2 MTH,WD,WN,P,NP"
<eif> "EULOAD" "ENDUSE DATA"
"DT#" "Hour" "actual demand"
1   1   0.2448000
1   2   0.2480000
1   3   1.2399998
1   4   0.1904000
1   5   0.5439999
1   6   0.2688000
1   7   1.0639998
1   8   3.5471995
1   9   3.7759994
1   10   1.3199998
1   11   0.5535999
1   12   0.5695999
1   13   0.4783999
1   14   0.3844799
1   15   0.5198399
1   16   0.2678400
1   17   0.7502399
1   18   0.5428799
1   19   1.0699198
1   20   1.3031998
1   21   0.8294399
1   22   0.4593599
1   23   0.3628799
1   24   0.3556799
2   1   0.2694857
2   2   0.2530285
```

Figure 18-1 Sample Daytype File

Chapter 20

The Individual Customer Analysis Program

Developed in response to user requests, the Individual Customer Analysis Program (ICA) is an extension to the Oracle Utilities Load Data Management and Analysis System and is included in the Analysis Bundle. This program enables you to quickly generate, report, and save statistics for individual customers — including Entire Period, Time-Of-Use (TOU), and Average Day-type statistics. Because it is an efficient tool for analyzing individual customer load patterns, ICA is useful for rate comparisons, customer service, load management applications, and more.

Topics included in this chapter are:

What Additional Capabilities Does ICA Provide?

If you have used the Oracle Utilities Load Data Analysis Subsystem, you are familiar with the Individual Customer Statistics (ICS) and the associated output file produced by the Analysis programs. ICA goes beyond the capabilities of these programs by providing more detail, with greater flexibility, and less effort. Below is a summary of the features of ICA for those already familiar with the ICS portion of the Analysis programs. See **What Can the Individual Customer Analysis Program Do?** on page 20-3 for a more complete overview of the capabilities of ICA.

- **Designed specifically to compute Individual Customer Statistics** — ICA eliminates the need to compute class statistics when only individual customer statistics are required, saving processing time.
- **Computes additional statistics** — ICA generates not only Entire Period statistics for individual customers, but also 20 different Average Day-type statistics as well as TOU statistics. Both 24-hour profiles and summary values can be produced.
- **Analyzes data in either ELDB or CLDB** — You can analyze data from either the ELDB or the CLDB. Analysis of the CLDB cuts is especially useful for billing-related applications.
- **Compares the impact of different TOU schedules** — With ICA, you can apply multiple TOU schedules to the same customer in a single program run, making rate comparisons easier.
- **Analyzes non-contiguous periods** — ICA enables you to examine customer usage across non-contiguous periods. You can specify any combination of hours, days, or months (up to a total of 36,000 intervals). For example, you can compute one set of statistics for two separate intermediate seasons (say, April 1 - June 30 and October 1 - December 31). With a feature called the *Demand Period File*, you can identify sets of hours for analysis, making it easy to examine curtailment periods and other periods of interest.
- **More flexible reporting** — ICA gives you control over which statistics are generated and reported. You also have new formatting options.
- **Enhanced output files** — ICA enables you to save all statistics. Output files include more descriptive information.

What Can the Individual Customer Analysis Program Do?

The Individual Customer Analysis Program (ICA) is an easy-to-use and efficient tool for analyzing the load patterns of individual customers. The program produces two basic types of statistics for each customer analyzed:

- **Time-Of-Use and Entire Period Statistics** — ICA produces summary statistics for specified periods. These statistics include: total energy (actual and prorated), maximum and minimum demand, and load factor.
- **Average Day** — The program also produces 24-hour, interval-by-interval demand profiles of "average days." You can specify any or all of 20 different day types (the complete list of options is shown in Table 20-1).

Table 20-1: Chart of Statistics

Statistics Computed by the Individual Customer Analysis Program

Time-Of-Use and Entire Period (Summary Statistics)

Actual energy (KWH)
Prorated energy (KWH)
Maximum demand (KW) and time of maximum demand
Minimum demand (KW) and time of minimum demand
Average demand (KW)
Load factor
Demand at the time of supplied peaks(s) (KW)
Load factor at the time of supplied peak(s)

Average-Day Demands (Interval-by-Interval Demand Profiles)

Average Sunday
Average Monday
Average Tuesday
Average Wednesday
Average Thursday
Average Friday
Average Saturday
Average weekday
Average weekday, excluding holidays
Average day
Average day, excluding holidays
Average weekend
Average weekend, excluding holidays
Average weekend and holidays
Average weekday holiday
Average weekend holiday
Day of maximum demand
Day of minimum demand
Day(s) of supplied peak(s)
Average demand period

Analysis Options

The ICA has been designed to give you a great deal of flexibility in designing and executing your analysis. For example, you can analyze any number of customers in a single analysis run.

You have many options for selecting the data to be analyzed:

- You can analyze customer load data in *either* the CLDB (Current Load Database) or the ELDB (Extracted Load Database). However, the CLDB data must have passed validation; otherwise, the program will reject it.
- You can specify that the load data meet a specified quality level.
- You can analyze data for a desired date range, or you can select specific cuts. Because CLDB cuts correspond to recording periods and hence billing cycles, this option is particularly useful for billing-related studies.
- You can even compute statistics for a set of date-ranges or *non-contiguous periods*. For example, it is possible to compute a customer's average winter load pattern using data from several winter seasons, or by average July usage using load data from several years.

Within your specified analysis date-range(s), it is also possible to designate special periods and to analyze them separately. More specifically, ICA includes a feature called the "Demand Period File." This file enables you to define any period or periods belonging to one of up to eight "demand periods." The blocks of time can be of any length, any number, and non-contiguous. All remaining, non-specified periods are considered "off-demand." The off-demand and specific demand periods are analyzed as separate cases. This application is particularly useful for examining the behavior of customers during interruption or curtailment periods, demand-free periods, or any other times of interest.

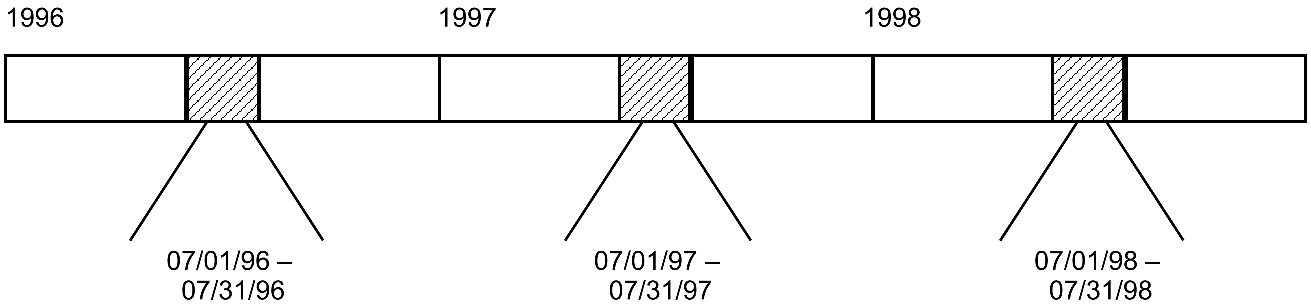
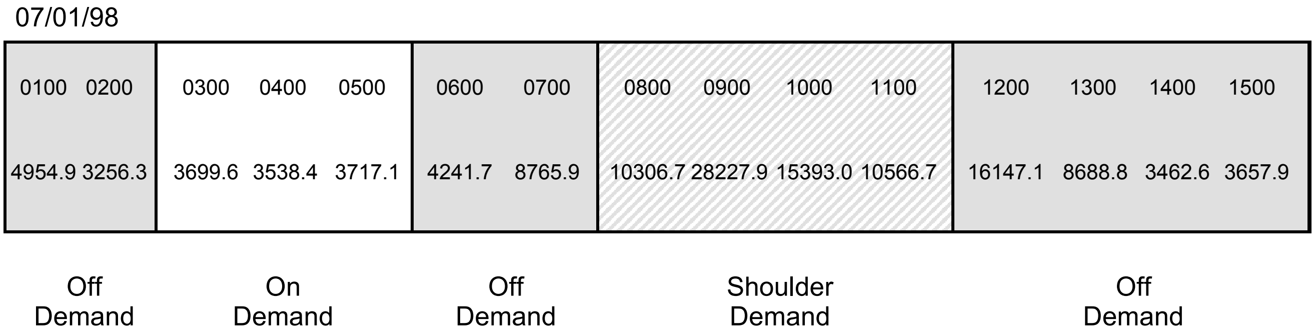


Figure 19-1 Application of Non-Contiguous Periods

ICA enables you to specify multiple, non-contiguous periods for analysis. (You use the Environment File to select the date-ranges.) In this example, ICA will produce one set of statistics for an average July using three months of data.

As with other Oracle Utilities Load Analysis programs, you can also apply Time-Of-Use schedules. In addition, an ICA feature enables you to apply different TOU schedules to the same customer in one program run. This is useful for comparing the potential impact of different schedules on customer rates.


07/01/98

0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500
4954.9	3256.3	3699.6	3538.4	3717.1	4241.7	8765.9	10306.7	28227.9	15393.0	10566.7	16147.1	8688.8	3462.6	3657.9
Off Demand		On Demand			Off Demand		Shoulder Demand				Off Demand			

Figure 19-2 Application of Demand Period File

You can use the Demand Period File to separate intervals into demand periods. The ICA will compare the load data in the analysis period to the Demand Period File, and will produce sets of statistics for each demand period.

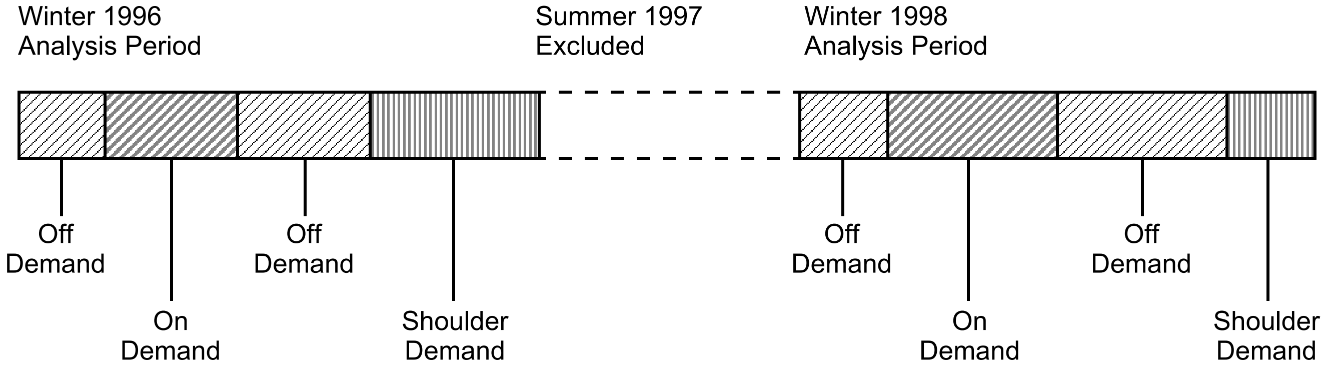


Figure 19-3 Combination of Non-Contiguous Periods and the Demand Period File

The ICA can also analyze non-contiguous date ranges and produce statistics for both off- and on-demand type periods. (The Environment File date-ranges define the periods to be analyzed, and the Demand Period File defines which intervals in the analysis periods belong in which demand period.) In this example, the program will examine two winter seasons and will produce profiles of the customer’s on-demand, shoulder and off-demand use.

Many of the analysis options described above are illustrated in the sample analyses included in *Chapter 3: The Oracle Utilities Load Analysis Data Formats*.

Reporting

Once the statistics have been calculated, you may report all of the results or only desired statistics. ICA can produce two types of reports for each customer analyzed: the Time-Of-Use Statistics Report and the Average Day Type Statistics Report. The reports are organized in a tabular format (columns and rows) similar to the Time Series Reporter format. You control the format — determining the order of the columns for Average Day Type Reports, and whether each new report begins on a separate page or each page contains as much information as possible. However, if average demand-period days are included, they are the last columns printed for a block.

Saving the Statistics for Further Analysis

You can specify that the results be written to a sequential file for further analysis and reporting by non-Oracle Utilities programs. The format of these files is described in detail in *Chapter 4: Oracle Utilities Load Analysis Mechanics*.

Steps for Using the Individual Customer Analysis Program

The following provides a detailed, step-by-step explanation of how to use the Individual Customer Analysis Program. It explains how to set up or modify the required input files — the Environment, Control, Demand Period, Time-Of-Use, and Holiday files — and how to evaluate the output reports.

Individual Customer Analysis may be performed on load data in the Current Load Database (CLDB) that has passed validation, or on load data that has been extracted to the Extracted Load Database (ELDB).

Here is a brief list of the steps you will follow when analyzing load data with the Individual Customer Analysis Program. Later in this chapter these steps are explained in detail.

Summary — Using Individual Customer Analysis

1. Create the Analysis Control File (TGY37A.CTL) — a list of the customers to be analyzed.
2. Create the Analysis Environment File (TGY37B.ENV)— a group of commands that you use to set analysis and reporting options.
3. Modify the Time-Of-Use Schedule File (TGY31D.TOU) if necessary.
4. Modify the Billing Cycle File (TGY23E.CYC) if necessary.
5. Modify the Demand Period File (TGY37E.DEM) if necessary.
6. Verify that the Holiday File (TGY31C.HOL) has been set up correctly.
7. Run the Individual Customer Analysis Program (Y370).
8. Check output:

    Analysis reports

    Individual Customer Statistics files.

Note: The Y370 program supports pre-process key generator. See **Using the Preprocess Key Generator in a Control File** on page 4-4 for more information.

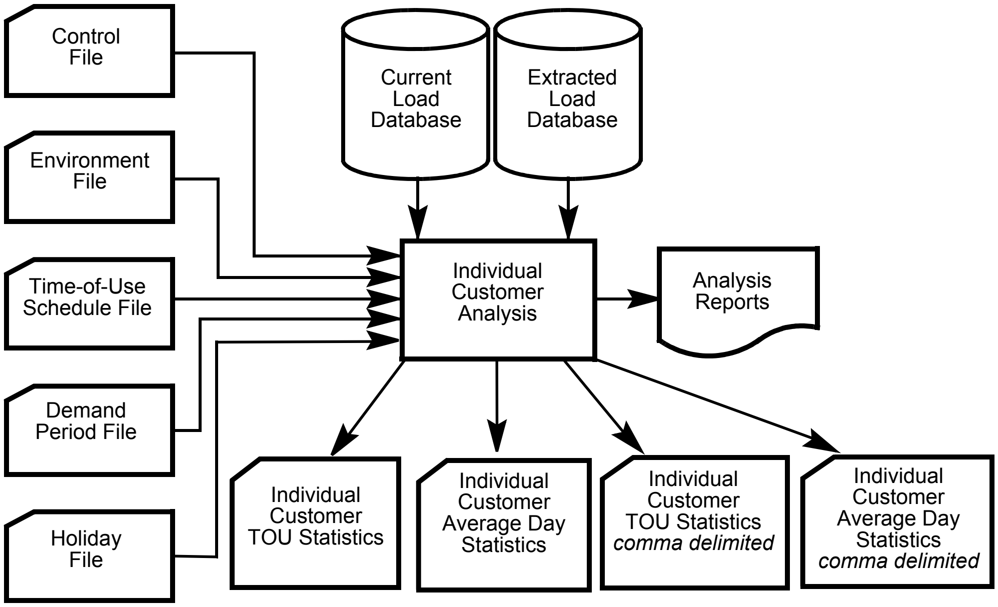

Control File
Environment File
Time-of-Use Schedule File
Demand Period File
Holiday File
Current Load Database
Extracted Load Database
Individual Customer Analysis
Analysis Reports
Individual Customer TOU Statistics
Individual Customer Average Day Statistics
Individual Customer TOU Statistics *comma delimited*
Individual Customer Average Day Statistics *comma delimited*

Figure 19-6 Overview of the Individual Customer Statistics Program

Step 1: Create the Analysis Control File (TGY37A.CTL)

The Analysis Control File is used to identify the customers you want to analyze, and to set two optional parameters (start-time and TOU Schedule).

You can type the file, or use the Key Generator or Customer Data Extraction Programs to construct it for you (these programs will select customer records that match user-defined criteria — see *Chapter 10* in the *Oracle Utilities Load Analysis Introductory Guide, Volume II*).

Each record in the file must follow the format shown below. Input one record per line. You may input blank spaces or commas between elements in the command record, but do *not* input blanks between the lines. There is no limit to the number of customers you can input.

> _customer-id chan1_ [{±}_chan2_ [{±}_chan3_...[{±}_chann_]]] [_start-time_ | _billing-cycle_] [**SCHedule**
> [**DEMand** | _t_ | 0] | **SEAson** [_s_ | 0]] [/*_comment_]

- **customer-id** — Input the Oracle Utilities Load Analysis customer-id.
- **channel-number** — Enter a channel-number or a combination of channels for that customer-id. A combination consists of two or more channels added or subtracted to represent the total customer load (e.g., 1+2-4 is the sum of channels 1 and 2 minus channel 4, a co-generation unit).

  > **Important Note: If you combine multiple channels for a customer-id and specify a start-time in the record (see below), each channel of data *must* have the same start- and stop-time.**

  > **Note:** If you want to combine multiple IDs for a large individual customer into a single record, you cannot do it in the Analysis Control File — you must use the Oracle Utilities Load Analysis Transformation Program.

- **start-time** — Use this *optional* parameter if you want to analyze customer load data by cuts. Input a cut's start-time in either the "mmddyyhhmmss" or "mm/dd/yy-hh:mm:ss" format.

  This start-time parameter makes it possible to: a) analyze cuts, and b) specify a different start-time for each customer in the Control File. (If you want to apply the same analysis period to all customers in the Control File, use the Environment File Date Command instead.)

  > **Note:** If you do use the start-time parameter, you ***must*** supply a start-time for ***every*** customer in the Control File.

  If you do not specify a start-time, the ICA program will use the date-range(s) specified in the Environment File.

- **billing cycle —** This optional parameter makes it possible to specify a different date *range* for each customer in the control file, rather than the start-time of a specific cut. You do this by specifying an integer from 1 to 99 representing one of the billing cycles defined in the Billing Cycle File. Each record in that file contains a billing cycle number, and the start and stop times that are defined for that cycle. If you specify a billing cycle for a customer in the Control File, the program will analyze that customer's load data over the date range defined for that cycle in the Billing Cycle File.

  > **Important Note:** If, as is often the case, a billing cycle start-time in the Billing Cycle File is defined as a date only (without hours, minutes, and seconds), the program will assume a start time of 00:00:00; if a billing cycle stop-time is defined as a date only, the program will assume a stop time of 23:59:59.

  SCHedule — Use this *optional* parameter to specify a Time-of-Use Schedule for the TOU calculations, or to specify that the Demand Period File be applied to the customer analysis. Enter a value "t " (where t = the number of the desired schedule in the TOU Schedule file), or "DEM" to apply the Demand Period File. (The TOU Schedule File and the Demand Period files are explained further later in this chapter.) You must include keyword SCH before the schedule number.

You use the TOU Schedule parameter in the Control File only when you want to override the Season Command or the Schedule Command in the Environment File — to specify a different schedule for selected customers, or to apply a different schedule to every customer in the analysis. If you do not specify “DEM” or a Season or TOU Schedule in a customer’s Control File record, the program will use your input in the Environment File Season Command or Schedule Command.

The program will accept the same customer-id/channel-number combination input multiple times with a different Season or TOU Schedule parameter (each entry must be a separate Control File record). This enables you to compare the effect of different schedules on a single customer.

- **SEAson —** Use this optional parameter if you want to apply different Time-of-Use schedules over different portions (seasons) of the analysis period, for this customer. Using either the SEASON or the SCHEDULE parameter in the Control File overrides the SEASON or SCHEDULE Command in the Environment File for the particular customer.

  If you specify SEASON 0 in the Control File, any SEASON Environment File Command will be overridden, and therefore a SCHEDULE Environment File Command specified with it, ordinarily ignored as superfluous, will be made effective.

- **comments** — You may add comments in the space remaining at the end of a line following a record command. These comments can serve as useful notes to yourself and others, and will not affect processing. Each comment *must* begin with the symbols “/*”.

Following are sample Analysis Control Files.

```
N1723   1
N1725   1
N1727   1
N1739   1
N1743   1
N2024   1+2             /* TOTAL TWO PREMISES
N2028   2
```

Figure 19-7 Portion of a sample Individual Customer Analysis Control File

Note: In this example, the analyst chose to combine channels for customer N2024. The load data for these customers will be analyzed over the date-range(s) specified in the Environment File.

```
N1723   1    07/12/98-10:01:00  SCH 1
N1725   1    07/13/98-11:06:00  SCH 2
N1727   1    07/14/98-09:26:00  SCH 1
N1739   1    07/12/98-13:18:00  SCH 1
N1743   1    07/15/98-10:43:00  SCH 2
N2024   1    07/13/98-08:13:00  SCH 1
N2024   2    07/11/98-12:23:00  SCH 1
```

Figure 19-8 Portion of a sample Individual Customer Analysis Control File

Note: In this example, the analyst chose to analyze specific cuts by including the cut start-time. Different time-of-use schedule numbers are also specified for different customers.

Step 2: Create the Analysis Environment File (TGY37B.ENV)

You use the Analysis Environment File to specify the conditions under which you want the analysis to be performed and reported. You create this file using the commands shown in Figure 19-9: Format for the Individual Customer Analysis Environment File. When creating the file, enter one command per line. Each line must begin with the command name (keyword); but you need enter only the first three letters of the keyword. You may enter the commands in any order. If you do not specify a command, the program will assume the default (underlined).

DATe [**CUT** | *start-time stop-time* [**MONthly** [**SUMmary**]]]

24H [**Yes** | **No**]

AGGregate [*n* | 0]

ROLling *n* [‘*q*’ | ‘8’]

MERge [**YES** | **NO**]

QUAlity [‘*q*’ | ‘8’]

PROrate [**YES** | **NO**]

SCHedule [**DEMand** | *t* | 0]

SEAson [*s* | 0]

PEAk *peak-time*

GROup *title*

PAGinate [**NO** | **YES**]

TOUreport [**NO** | **YES**]

AVGreport [*Avg1* [,*Avg2* [,*Avg3* ....[,*Avg8*]]] | **NO** | **COMplete**]

WRIte [**TOU** | **AVErage** | **NO** | **COMplete**] [**SEParate**]*
* **SEP** option is not valid when **NO** is specified.

Figure 19-9 Format for the Individual Customer Analysis Environment File

As in the Control File, you may add descriptive comments in any Environment File record. Each comment *must* begin with the symbols “/* ”.

DATe [**CUT** | *start-time stop-time* [**MONthly** [**SUMmary**]]]

- **Date** — Use this command to establish the analysis period. You have two options: a) You can input a start- and stop-time to define a common analysis period that the program will apply to all customers in the Control File; or, b) You can input “CUT” to indicate that you have supplied start-times or billing cycles in the Control File to be applied to each customer individually. The default is “CUT”.

Specify the start- and stop-times in either the “mm/dd/yy-hh:mm:ss” or “mm/dd/yy” format. If no time is specified with the date, the program will assume a default start-time of 00:00:00 and stop-time of 23:59:59.

You can analyze non-contiguous periods for which data exists in the ELDB or CLDB by specifying up to 25 different date ranges. Each date range must be supplied as a separate command. Also, you must keep the following limitations in mind:

- No date range may encompass more than 36000 intervals. This allows for the specification of date ranges as large as 375 days for 900-second data, 750 days for 1800-second data, or 1500 days for 3600-second data.
- Multiple date ranges must be specified in chronological order, with no overlapping date ranges allowed.
- Only valid CLDB data may be analyzed. If you attempt to analyze invalid data for a customer the program will issue an error message for that customer-id and will continue processing with the next valid customer record.

The **MONthly** keyword will cause the program to produce separate reports for each calendar month included within the specified date range. The period covered by the first report will therefore begin at the specified start-time and extend through the end of that month. Each subsequent report will cover an entire month, with the possible exception of the last report, which will end with the specified stop-time.

The **MONthly** keyword may be placed either before the start-time or after the stop-time. If more than one DATe Command is coded, any specifications of **MONthly** will cause the program to terminate with an error message and return code of 99.

The **SUMmary** keyword will cause the program to produce a Monthly Summary Report for each time-of-use period within the operative date range for each customer. The **SUMmary** keyword must be coded immediately following the **MONthly** keyword, and will produce a report only if the Time-Of-Use Statistics File is produced. It is therefore necessary to code either **WRIte COMplete** or **WRIte TOU** in addition to **DATe MONthly SUMmary** to produce the Monthly Summary Report.

24H [Yes | No]

24H — Use this optional command to specify whether or not data should be reported in 24-hour adjusted format. If a cut crosses the spring boundary, then an extra hour of missing data with value zero and status code "9" is inserted during the spring DST hour. If a cut crosses the fall boundary, then the two fall DST hours are averaged together.

AGGregate [*n* | 0]

- **Aggregate** — Input a value for “n” to establish the number of seconds-per-interval for the analysis data; 0, 300, 900, 1800, and 3600 are permitted values. The default is 0 or no aggregation — the intervals would be analyzed in whatever seconds-per-interval they currently exist.

  Where possible, the program will sum each customer’s load data to the specified level. ***Note***: If the interval length of a customer’s data exceeds the value you input, the program will ignore that customer in the Control File.

ROLling *n* [‘*q*’ | ‘8’]

- **Rolling** — An optional command which enables you to report the analysis results in a rolling format. That is, each interval of the analysis period is an average of a number of preceding interval values and the current interval itself.

The Rolling Command consists of two parameters — “n” to specify the level of aggregation for use in computing the rolled interval, and ‘q’ to set the level of acceptable data quality for the averaging.

The value for “n” must be greater than, and a multiple of, the analysis data’s interval length. The program will average the analysis data at the level set by “n”. For example, if the original analysis data has a level of aggregation of 900 seconds and you set “n” to 3600, then each output interval will be the average of itself and the three preceding 900-second interval values.

For ‘q’, input the status code for the minimum data quality you want included in the averaging. (See the status code list in the “*Quick Reference*” section.) Any intervals that have status codes greater than ‘q’ will be excluded from the averaging. ***Note***: The status code *must* be input with apostrophes (‘) on either side. The default is ‘8’.

Oracle Utilities Load Analysis sets the status codes of the output intervals to the worst of the input status codes. However, if an input interval was missing or excluded, the output status code can be no better than ‘5’.

MERge [YES | NO]

- **Merge**— An optional command. When set to “YES”, the program will merge all cuts found within the specified date range regardless of validation status. When set to “NO” (default), the program will reject invalid cuts and return an error message indicating the cuts are not merge-able.

QUAlity [‘*q*’ | ‘8’]

- **Quality** — Use this command to set the level of acceptable data quality for the analysis. Input the worst acceptable status code. The program will treat any interval with a status code greater than ‘q’ as missing. ***Note***: The status code must be input with apostrophes (‘) on either side. The default is ‘8’.

PROrate [YES | NO]

- **Prorate** — Use this command to specify whether or not total energy values for each customer should be adjusted to compensate for missing data. Application of the Prorate Command affects any calculations based on energy, including load factors. However, it does *not* fill in missing demand values.

  If you input “PRO YES”, the customer’s total energy value will be multiplied by the ratio of expected intervals to actual intervals within each time-of-use period. If you input “PRO NO”, the program will make no adjustments for missing or excluded data. No is the default.

SCHedule [**DEMand** | *t* | 0]

Schedule — Use this command to select a schedule from the Time-Of-Use Schedule File for the time-of-use calculations, or to specify that the Demand Period File be applied. (These files are explained further in Step 3 and Step 5.) Enter “SCH DEM” if you wish to apply the Demand Period File to the analysis run. If you wish to apply a TOU Schedule, enter “SCH t” (where “t” equals the number of the desired schedule in the TOU Schedule File).

The default, “SCHEDULE 0”, automatically defines a single time-of-use period equal to the entire analysis period.

Remember, your input for this command will be applied to all customers in the analysis; however, you can use the TOU Schedule parameter in the Control File to override it for specific customers.

In some cases you may want to analyze a customer's load pattern in two ways with one analysis run — once with the Demand Period File and then with one or more TOU schedules. Here is how you can set that up:

1. Input SCH DEM in the Environment File.
2. Input the customer-id/channel-number in the Control File without a TOU Schedule (this will give you the analysis with the Demand Period File).
3. Input the customer-id/channel-number in the Control File again, this time with the desired TOU Schedule number. If you want to apply more TOU schedules, simply add additional records to the Control File.

> **Important Note:** Each customer must have at least one non-missing interval in each TOU period or demand period to be analyzed.

SEAson [*s* | <u>0</u>]

- **Season —** Use this command if you want to apply different Time-of-Use schedules over different portions (seasons) of the analysis period. Use "s" to specify the Season Schedule, contained in the Season File, that you want used. The default, SEASON 0, suppresses season processing.

  If you include both the SEASON Command and the SCHEDULE Command in the Environment File, the program will use the SEASON Command and disregard the SCHEDULE Command (unless you have specified SEASON 0). If you include neither command, the default is SCHEDULE 0.

PEAk *peak-time*

- **Peak** — This command enables you to specify the date and time of peaks of interest. The program will compute statistics for the entire day in which each supplied peak falls.

  You must use the format "mm/dd/yy-hh:mm:ss" to specify the peak. You can input up to 25 peaks, one peak per line. The default is no peaks.

GROup *title*

- **Group** — Use the Group Command to assign titles to appear at the top of each Customer Analysis report produced at the end of the program run. You can input up to two Group commands (one per line), for up to two titles at the top of the reports. Each title is limited to 76 characters. If you omit the command, no title will be printed.

PAGinate [**NO** | **<u>YES</u>**]

- **Paginate** — Use this command to specify how reports should be printed. If you select the PAG NO option, the program will fit as many lines as possible on a page. This option conserves paper, but a page break may occur in the middle of a report. With the PAG YES option, each report begins on a new page. With either option, a report for a new customer automatically starts at the top of a page. The default is PAG YES.

TOUreport [**NO** | **<u>YES</u>**]

- **Time-Of-Use Statistics report** — This command indicates whether you wish to print the Time-Of-Use Statistics Report for each customer analyzed. TOU YES is the default. (***Note***: You can write the statistics to an output file even if you do not choose to report them.)

AVGreport [*Avg1* [,*Avg2* [,*Avg3* ....[,*Avg8*]]] | **NO** | **COMplete**]

- **Average Day-Type Statistics report** — This command indicates whether you wish to print the Average Day-Type Statistics Report for each customer analyzed. You may print all of the statistics calculated, none of the statistics, or just selected ones.
  - **Selected statistics (Avg 1, etc.)** — If you want to select only certain statistics for reporting, input the keyword AVG followed by the abbreviations identifying the desired statistics (the abbreviations are listed in Table 20-2). Separate each abbreviation with a comma or a blank.

    You can input up to 25 maximum AVG commands followed by a group of abbreviations. Each command designates a group of statistics (columns) that will be printed together on a page. You can input up to eight statistics per command, in any order (up to eight columns can be printed across the width of the page; the statistics will appear in the order you specify). You can repeat statistics to appear more than once in a report.
  - **NO** — If you wish to report no statistics, input AVG NO. (***Note***: You can write the statistics to an output file even if you do not report them.)
  - **COM** — If you wish to report all 20 average-day-type statistics, input AVG COM. This is the default. Do *not* input any selected statistics if you use the COM option.

Table 20-2: Abbreviations for specifying Average Day Type Statistics in the Environment File's AVGREPORT Command

Average Day Type Statistics Abbreviations	
AD	Average day
ADX	Average day, excluding holidays
WD	Average weekday
WDX	Average weekday, excluding holidays
WN	Average weekend
WNX	Average weekend, excluding holidays
WEH	Average weekend and holidays
WDH	Average weekday holiday
WNH	Average weekend holiday
SUN	Average Sunday
MON	Average Monday
TUE	Average Tuesday
WED	Average Wednesday
THU	Average Thursday
FRI	Average Friday
SAT	Average Saturday
MAX	Day of Maximum
MIN	Day of Minimum
DEM	Average Demand Period*
P01-P25	Day of supplied peak X

**The Average Demand Period statistic may be calculated and reported if you have a Demand Period File, regardless of whether or not you apply a TOU Schedule to the analysis.*

WRIte [**TOU** | **AVErage** | **NO** | **COMplete**] [**SEParate**]*
* **SEP** option is not valid when **NO** is specified.

- **Write** — Use this command to determine which, if any, statistics should be written to output files. (The formats of these files are explained in *Chapter 4: Oracle Utilities Load Analysis Mechanics*.)
    - **TOU** — Input WRI TOU if you wish to output just the Time-Of-Use type statistics.
    - **AVE** — Input WRI AVE if you wish to output just the Average Day-Type statistics.
    - **NO** — Input WRI NO if no statistical records should be written out.
    - **COMplete** — Input WRI COM to write all statistical records produced by the analysis run to the output files. This is the default.
    - **SEParate** — Input SEP after the above WRI commands to produce a delimited file (i.e., WRI COM SEP). ***Note***: SEP is not valid with the WRI NO Command.

```
GROUP      INDIVIDUAL RESIDENTIAL CUSTOMERS
DATE 05/01/99-00:00:00     05/31/99-23:59:59
SCH 1
PRO OFF
QUA ‘L’
AGG 60
PEAK 05/10/99-16:00:00
TOU YES
AVG COM
WRITE TOU
```

Figure 19-10 Sample Environment File

Step 3: Modify the Time-of-Use Schedule and Season Files if Necessary

Modify the Time-of-Use Schedule File (TGY31D.TOU) and Season File (TGY31E.SEA) if necessary. If you are applying TOU schedules in your analyses, the Individual Customer Analysis Program will require the Time-Of-Use (TOU) Schedule File as input.

A TOU Schedule classifies each hour in a week as on-peak, off-peak, or shoulder. Depending upon how you set up the Environment and Control files, ICA can apply one TOU Schedule to all customers in one analysis run, or it can apply different schedules to specified customers.

If you are using Season processing in your analysis, the Individual Customer Analysis Program will also require the Season File as input. The Season File consists of Season Schedules, each of which divides the year into seasons, and may specify different TOU schedules for different seasons. Use of Season processing thus enables you to apply different TOU schedules over different portions of an analysis data range. To ensure TOU periods are calculated correctly, verify that the TOU periods used by the different TOU schedules are consistent. For example, if TOU Period 1 is used for ON PEAK period, then TOU Period 1 should be used as ON PEAK for all TOU schedules involved.

Typically, the Season and TOU Schedule files are set up when your Oracle Utilities Load Analysis system is installed. For your analyses, you may wish to run the data against new Season or TOU schedules, or simply use those that already exist. In either case, you should be aware of how the files are constructed. Talk to your supervisor or read *Chapter Seven* in the *Oracle Utilities Load Analysis Load Data Analysis User's Guide* if you are not already familiar with this file.

> **Important Note:** The Season and TOU Schedule files should be considered permanent files, accessed by many Oracle Utilities Load Analysis users. If you modify either file, be certain that your changes will not unintentionally or

adversely affect others. You may use the default files or local files located in your Data directory.

Step 4: Modify the Billing Cycle File (TGY23E.CYC) if necessary

If you are specifying billing cycles in your Control File, the Individual Customer Analysis Program will also require the Billing Cycle File as input. A Billing Cycle File defines one or more billing cycles, numbered from 1 up to a maximum of 99, and gives start and stop times for each. This file is discussed in greater detail in the *Oracle Utilities Load Analysis Load Data Analysis User's Guide*.

Important Note: Cautions given with regard to modifying the Season and TOU Schedule files apply to the Billing Cycle File as well.

Step 5: Modify the Demand Period File (TGY37E.DEM) if Necessary

The Demand Period File is used to designate blocks of time as special periods of interest — such as demand-free, curtailment, interruption, or control periods. You can then apply the ICA program to analyze customer behavior during these designated periods.

The Demand Period File itself can be set up to cover any length of time (even a year or more). Within that period, you designate specific blocks of time as belonging to a particular “demand period.” These blocks can be of any length, any number, and non-contiguous. The program assumes that all remaining, non-specified periods are “off-demand.”

When you run a Demand Analysis for a customer, the program looks at the Environment File to determine the analysis period, and then at the Demand Period File to determine which intervals in the analysis period are in which demand period. It then produces statistics for up to eight user-specified demand periods and one non-specified (“off-demand”) period.

You can set up a number of different Demand Period files for different applications.

The Demand Period File is set up using the following record formats:

PERiod n [description]

- **PERIOD Statement** — Use this optional statement if you wish to define several demand periods over the analysis date range. Place the PERIOD Statement *before* the date records for a given demand period. Date records between this PERIOD Statement and the next (or the end of the file) define the demand period described in the PERIOD Statement.

  “n” represents the period number, and is required; valid values are the numbers 1 through 8. “Description” is optional, and may be used to supply a report column heading for the demand period; any character string may be supplied, but it will be truncated if more than 13 characters in length. If no description is entered, the default column heading is “DEM PER n”.

  If no PERIOD statements are included in the Demand Period File, all time periods on date records in the file define a single “on-demand” period.

  If any PERIOD statements are included in the Demand Period File, the first record in the file must be a PERIOD Statement. Each PERIOD Statement must be followed by at least one date record. Periods may be defined in any sequence, but no period numbers may be skipped — for example, if Period 4 is defined, Periods 1 - 3 must be also.

- **Date Record** — Each date record identifies a day, and the times during that day which are to be included in the demand period being defined. There is no limit to the number of periods which you can define for a given day. However, a record cannot exceed 80 characters. If your list of time periods for a day exceeds 80 characters, simply add one or more records for that date. You must separate parameters within a record by a blank.

  Any dates you do not enter will be treated as being in an extra, non-specified demand period.

date start-time$_1$ stop-time$_1$ start-time$_2$ stop-time$_2$ start-time$_x$ stop-time$_x$

- **Date** — Input the date in the “mm/dd/yy” format.
- **Start and Stop** — Identify each portion of that date that is within the demand period being defined, with a start-time and a stop-time (for example “010000 085959”). Times may be in

either the "hhmm" format or the "hhmmss" format. Again, there is no limit to the number of time segments you may specify for a date, but each record cannot exceed 80 characters. If your list exceeds 80 characters, begin a new line with the date and continue entering time pairs.

- **All** — If the entire day is in the demand period, enter ALL. The program will consider all hours of the day in the analysis.

```
END description
```

- **END Statement** — The program creates an extra demand period for all intervals in the analysis period that have not been specified in the Demand Period File. A single optional END Statement may be used to supply a column-heading description for this extra period. If no END Statement is supplied, the default description is "Off Demand".
- If used, the END Statement must be the last record in the Demand Period File.

> **Note:** Oracle Utilities Load Analysis will continue to accept your old-format Demand Period files that were used in releases prior to Release 8.0, in which the times were made up of hours and minutes only, without seconds. In such a case, the Oracle Utilities Load Analysis programs will internally subtract one minute from each record's start time, and one second from each record's stop time, bringing the times into conformity with the newer hh:mm:ss format. For example, an old-format record designating a time period of 08:01 through 15:00 will have these times converted to 08:00:00 and 14:59:59, respectively.

```
PERIOD 1 Curtailment
    051299  0001  0001  0001  0245  0801  0900  0912  1105  1145  1530
    051399  0001  0001  0001  0245  0801  0900  0912  1105  1145  1530
    051499  0001  0001  0001  0245  0801  0900  0912  1105  1145  1530
    051599  1330  1605  1731  1845  2001  2100  2137  2205  2345  2400
    051699  1330  1605  1731  1845  2001  2100  2137  2205  2345  2400
    051799  ALL
    052199  1330  1605  1731  1845  2001  2100  2137  2205  2345  2400
    052299  0001  0001  0001  0245  0801  0900  0912  1105  1145  1530
PERIOD 2 Demand Free
    052399  0001  0001  0001  0245  0801  0900  0912  1105  1145  1530
    052499  0001  0001  0001  0245  0801  0900  0912  1105  1145  1530
    052599  1330  1605  1731  1845  2001  2100  2137  2205  2345  2400
    052699  1330  1605  1731  1845  2001  2100  2137  2205  2345  2400
    052799  1330  1605  1731  1845  2001  2100  2137  2205  2345  2400
    060599  ALL
    060699  ALL
    061199  1330  1605  1731  1845  2001  2100  2137  2205  2345  2400
    061299  0001  0001  0001  0245  0801  0900  0912  1105  1145  1530
    061399  0001  0001  0001  0245  0801  0900  0912  1105  1145  1530
    061499  0001  0001  0001  0245  0801  0900  0912  1105  1145  1530
    061599  1330  1605  1731  1845  2001  2100  2137  2205  2345  2400
    061699  1330  1605  1731  1845  2001  2100  2137  2205  2345  2400
    061799  1330  1605  1731  1845  2001  2100  2137  2205  2345  2400


END Off-Demand Hours
```

Figure 19-11 Demand Period File

Step 6: Verify that the Holiday File (TGY31C) has Been Set Up Properly

The Holiday File is another required input for the program. It is typically set up at Oracle Utilities Load Analysis system installation, and updated just once a year. It contains a list of the dates of all national and local holidays that apply to your service territory. In the unlikely event that you will need to change the file, see *Chapter 7* of the *Oracle Utilities Load Analysis Load Data Analysis User's Guide* for instructions.

Step 7: Run the Individual Customer Analysis Program

Once you have created and verified the necessary input files, you are ready to run the analysis program. Submit the Individual Customer Analysis job.

Step 8: Check Output

At the end of its run, the Individual Customer Analysis Program produces the following output:

- **Individual Customer Analysis Environment Report** — This report lists back the processing parameters you specified in the Environment File. Check this report carefully to ensure that the program was executed as you anticipated.
- **Individual Customer Definition Report** — This report lists all cuts which were analyzed and identifies any problems encountered during processing. If the program executed successfully, the message "Individual Customer Analysis (TGY370) successfully completed" will appear at the bottom of the report. Be sure to check for this message.
- **Time-Of-Use Statistics Report** — The program will produce one of these reports for each customer in the analysis, if you selected the TOU Report option in the Environment File.
- **Average Day Type Statistics Report** — The program will produce one of these reports for each customer in the analysis, if you selected the AVG Report option in the Environment File.

  Note: In some cases, a report column may be filled with dashes. If the column has a mix of dashes and data, it probably indicates missing data.

  If the entire column is filled with dashes, it most likely means that the average day-type did not occur in the analysis period (for example, there may have been no "weekend holidays" in the period you specified for analysis).
- **Monthly Summary Report** — The program will produce one of these reports for each time-of-use period within the effective date range for each customer in the analysis, if you coded MONthly SUMmary with the Environment File DATe Command and you coded either COMplete or TOU with the Environment File WRIte Command.
- **Individual Customer Statistics File** — Depending upon how you specified the Environment File Write Command, the program can produce up to four files at the end of each successful analysis run. One file will contain Time-Of-Use Type statistics, the other file will contain the Average-Day Type statistics. These files can be used for ad hoc analysis with external applications. The remaining two files are comma-delimited versions of the aforementioned files to allow easy importation into spreadsheet packages.

Samples of the reports are shown on the following pages and in *Chapter 3: The Oracle Utilities Load Analysis Data Formats*. The format of the ICS files is described in *Chapter 4: Oracle Utilities Load Analysis Mechanics*.

Sample Applications of the Individual Customer Analysis Program

The following includes four sample analyses. They are intended to show you how to set up the input files and evaluate the output, as well as to give you a broader understanding of how the program's capabilities can be applied in different situations. The examples illustrate analysis of:

- Non-contiguous periods
- CLDB cuts
- Curtailment periods
- TOU periods

The samples on the following pages highlight some of the key features of the ICA, and may suggest ways in which you can apply the program to your operations.

Here is a list of the four examples and what each is intended to illustrate:

Example A — how to set up an analysis of customer load data over non-contiguous calendar periods (in this case, three Julys).

Example B — how to analyze a series of CLDB cuts that correspond to customer billing cycles.

Example C — how to use the Demand Period File to examine customer usage during Curtailment Periods.

Example D — how to limit output to just one type of statistic.

For each example, we will look at the input files and the output reports. While each analysis is performed on a group of customers, we will show the output reports for just one representative customer, since the report format is the same for every customer in the analysis.

Example A — Non-Contiguous Periods

In this analysis, our objective is to generate profiles of an average July for each of five customers, using load data gathered over three years (July 1998, July 1999, and July 2000).

Control File A

```
N1723     1
N1725     1
N1736     1
N1743     1
N2024     1+2
```

Environment File A

Note: **Non-contiguous date-ranges specified for analysis**

```
GROUP      ANALYSIS OF INDIVIDUAL RESIDENTIAL CUSTOMERS
GROUP      MONTH OF JULY DEMAND OVER THREE YEARS
DATE 07/01/98    07/31/98
DATE 07/01/99    07/31/99
DATE 07/01/00    07/31/00
SCH 1
PRO ON
QUA ‘L’
AGG 3600
PEAK 07/15/98-15:00:00
PEAK 07/20/99-17:00:00
PEAK 07/22/00-16:00:00
PAG YES
TOU YES
AVG COM
WRITE COM
DES NO
```

Example B — CLDB Cuts

Our objective here is to analyze customer loads during a billing cycle. Since each CLDB cut typically corresponds to the customer's billing period, we will analyze the CLDB cut data directly. We will use the ICA program option, which enables us to specify cuts by inputting their start-times in the Control File.

Control File B

```
N1723                         1    05/13/98-13:56:59
N1725                         1    05/14/98-10:56:59
N1736                         1    05/13/98-12:17:59
N1743                         1    05/14/98-12:33:59
N2024                         1    05/14/98-09:54:59
N2024                         2    05/14/98-09:54:59
```

Note: cut start-times specified for analysis

Environment File B

```
GROUP     ANALYSIS OF INDIVIDUAL RESIDENTIAL CUSTOMERS
GROUP     MAY 1998 BILLING MONTH
SCH 1
PRO ON
QUA ‘L’
AGG 3600
PEAK 05/15/98-15:00:00
PAG YES
TOU YES
AVG COM
WRITE COM
DES NO
```

Example C — Curtailment Periods

Our goal here is to examine customer usage during Curtailment Periods over the month of May. We will identify the times of curtailment in the Demand Period File. We will also specify a set of Average Day Type statistics for reporting.

Control File C

```
N1723 1
N1725 1
N1736 1
N1743 1
N2024 1
```

Environment File C

Note that Schedule Command is set to Demand Option, indicating that we want to apply Demand Period File.

```
GROUP      ANALYSIS OF INDIVIDUAL RESIDENTIAL CUSTOMERS
GROUP      DURING LOAD CURTAILMENT PERIODS
DATE       05/01/98   05/31/98
SCH DEM
PRO ON
QUA ‘L’
AGG 3600
PEAK 05/10/98-16:00:00
PAG  NO
TOU  YES
AVG  MAX   MIN      DEM   P01
AVG  SUN   MON   TUE    WED    THU    FRI    SAT
WRITE  COM
DES NO
```

We have asked for only certain Average Day Type Statistics to be printed. Each line here corresponds to one page of statistics in the output report.

Demand Period File

```
051298   0001   0001   0001   0245   0801   0900   0912   1105   1145   1530
051398   0001   0001   0001   0245   0801   0900   0912   1105   1145   1530
051498   0001   0001   0001   0245   0801   0900   0912   1105   1145   1530
051598   1330   1605   1731   1845   2001   2100   2137   2205   2345   2400
051698   1330   1605   1731   1845   2001   2100   2137   2205   2345   2400
051798   ALL
052198   1330   1605   1731   1845   2001   2100   2137   2205   2345   2400
052298   0001   0001   0001   0245   0801   0900   0912   1105   1145   1530
052398   0001   0001   0001   0245   0801   0900   0912   1105   1145   1530
052498   0001   0001   0001   0245   0801   0900   0912   1105   1145   1530
052598   1330   1605   1731   1845   2001   2100   2137   2205   2345   2400
052698   1330   1605   1731   1845   2001   2100   2137   2205   2345   2400
052798   1330   1605   1731   1845   2001   2100   2137   2205   2345   2400
```

Example D — TOU Periods

In this analysis, our objective is to produce summary (i.e., Time-Of-Use) statistics for a group of customers. We will specify that only TOU statistics be reported and written to the output file.

Control File D

```
N1723                    1
N1725                    1
N1736                    1
N1743                    1
N2024                    1+2
```

Environment File D

```
GROUP      INDIVIDUAL RESIDENTIAL CUSTOMERS
GROUP      TIME OF USE DEMAND ANALYSIS
DATE 05/01/98-00:00:00    05/31/98-23:59:59
SCH 1
PRO OFF
QUA 'L'
AGG 3600
PEAK 05/10/98-16:00:00
TOU YES
AVG NO
WRITE TOU
DES NO
```

We have specified that only TOU statistics be reported and written to the output file.

Average Day Type statistics will not be reported.

Individual Customer Analysis Statistics Output File Format

The following describes the format of the two output files that can be produced by the Individual Customer Analysis Program:

- Time-Of-Use Statistics
- Average Day Statistics.

The Individual Customer Analysis Program gives you the option of creating files of customer statistics at the conclusion of a successful analysis. You can apply additional analysis or reporting routines to them. Two types of files can be created:

- Time-Of-Use Statistics
- Average Day Statistics.

The Write Command in the Environment File controls which files are created. Input "SEP" after the Write Command to produce a comma-delimited version of the report(s).

File Formats

The file formats are shown in Table 20-3 and Table 20-4. Each output file will contain statistics for all customers in the analysis run.

In the Time-Of-Use Statistics File, each record corresponds to a single customer. Each record length is fixed at 2461.

In the Average Day Statistics File, each record represents one interval in a 24-hour day. Each record length is fixed at 1500.

To conserve space, the start- and stop-times in either file type refer to the earliest and latest times indicated for analysis (as opposed to recording the start- and stop-time of each individual date range included in the analysis).

Table 20-3: Time-Of-Use Statistics Output File Format

ELEMENT	PERIOD	DESCRIPTION	ATTRIBUTE
1	—	Group Title 1	Char(78)
2	—	Group Title 2	Char(78)
3	—	Customer-id	Char(64)
4	—	Channel combination	Char(90)
5	—	Number of date ranges	Integer(2)
6	—	Start-time	Char(17)
7	—	Stop-time	Char(17)
8	—	Descriptor	Char(80)
9	—	Intervals per hour	Integer(5)
10	—	Number of supplied peaks	Integer(2)
11	—	TOU schedule number	Integer(2)
12	—	Number of TOU periods	Integer(2)
13	—	Time-of-use description	Char(30)
14	Entire	Expected observations	Real(4)
15	Entire	Valid observations	Real(4)
16	Entire	Energy	Real(8)
17	Entire	Prorated energy	Real(8)
18	Entire	Maximum demand	Real(8)
19	Entire	Time of maximum demand	Char(17)
20	Entire	Minimum demand	Real(8)
21	Entire	Time of minimum demand	Char(17)
22	Entire	Average demand	Real(8)
23	Entire	Load factor	Real(8)
24	TOU 1	Time-of-use description	Char(30)
25	TOU 1	Expected observations	Real(4)
26	TOU 1	Valid observations	Real(4)
27	TOU 1	Energy	Real(8)
28	TOU 1	Prorated energy	Real(8)
29	TOU 1	Maximum demand	Real(8)
30	TOU 1	Time of maximum demand	Char(17)
31	TOU 1	Minimum demand	Real(8)
32	TOU 1	Time of minimum demand	Char(17)
33	TOU 1	Average demand	Real(8)
34	TOU 1	Load factor	Real(8)
•	•	•	•
•	•	•	•
121	TOU 9	Load factor	Real(8)
122	—	Supplied peak 1 demand	Real(8)
123	—	Supplied peak 1 load factor	Real(8)
124	—	Time of supplied peak 1	Char(17)
•	•	•	•
•	•	•	•
193	—	Supplied peak 25 demand	Real(8)
194	—	Supplied peak 25 load factor	Real(8)
195	—	Time of supplied peak 25	Char(17)

Table 20-4: Average Day Statistics Output File Format

ELEMENT	PERIOD	DESCRIPTION	ATTRIBUTE
1	Entire	Group Title 1	Char(78)
2	Entire	Group Title 2	Char(78)
3	Entire	Customer-id	Char(64)
4	Entire	Channel combination	Char(90)
5	Entire	Number of date ranges	Integer(2)
6	Entire	Start-time	Char(17)
7	Entire	Stop-time	Char(17)
8	Entire	Interval start-time	Char(6)
9	Entire	Seconds per interval	Integer(5)
10	Entire	Number of supplied peaks	Integer(2)
11	Entire	Time of Maximum Demand	Char(17)
12	Entire	Time of Minimum Demand	Char(17)
13	Entire	Time of Supplied Peak 1	Char(17)
•	•	•	•
•	•	•	•
37	Entire	Time of Supplied Peak 25	Char(17)
38	Entire	Average day demand	Real(8)
39	Entire	Avg. day excl. holidays demand	Real(8)
40	Entire	Average weekday demand	Real(8)
41	Entire	Avg. weekday excl. holidays	Real(8)
42	Entire	demand	Real(8)
43	Entire	Average weekend demand	Real(8)
44	Entire	Avg. weekend excl. holidays	Real(8)
45	Entire	demand	Real(8)
46	Entire	Avg. weekend & holiday demand	Real(8)
47	Entire	Avg. weekday holiday demand	Real(8)
48	Entire	Avg. weekend holiday demand	Real(8)
49	Entire	Maximum day demand	Real(8)
•	•	Minimum day demand	•
•	•	Supplied Peak Day 1 demand	•
73	Entire	•	Real(8)
74	Entire	•	Real(8)
75	Entire	Supplied Peak Day 25 demand	Real(8)
76	Entire	Average demand period 1	Real(8)
77	Entire	demand	Real(8)
78	Entire	Average demand period 2	Real(8)
79	Entire	demand	Real(8)
80	Entire	Average demand period 3	Real(8)
81	Entire	demand	Real(8)
82	Entire	Average demand period 4	Real(8)
83	Entire	demand	Real(8)
84	Entire	Average demand period 5	Real(8)
85	Entire	demand	Real(8)
86	Entire	Average demand period 6	Real(8)
87	Entire	demand	Real(8)
88	Entire	Average demand period 7	Real(8)
89	Entire	demand	Real(8)
90	Entire	Average demand period 8	Char(339)
		demand	
		Average demand period 9	
		demand	
		Average Sunday demand	
		Average Monday demand	
		Average Tuesday demand	
		Average Wednesday demand	
		Average Thursday demand	
		Average Friday demand	
		Average Saturday demand	
		Filler	

Note: Each record represents *one interval* in a 24-hour day. Assuming 3600-second data, the file would be structured as:

Cust-id	**Ch**	**#Dates**	**Start**	**Stop**	**Interval Start**	**SPI**	**. . .**	**AD**	**ADX**	**WD**	**. . .**
A	1	1	12019900000	123199235959	0001	3600	. . .	28	25	22	. . .
A	1	1	12019900000	123199235959	0101	3600	. . .	27	26	20	. . .

Quick Reference

This section summarizes the record formats for input files and other often-used conventions in the Individual Customer Analysis Program (ICA):

- Procedure Numbers
- Control File Record Format
- Environment File Record Format
- Average Day Type Statistics Abbreviations
- Demand Period File Record Format
- Time-Of-Use Schedule File Record Format
- Holiday File Record Format
- Oracle Utilities Load Analysis Load Data Status Codes.

Individual Customer Analysis Program Numbers

To analyze ELDB data	Y370
To analyze CLDB data	X370

Control File Record Format

TGY37A.CTL (for ELDB data)

$$customer\text{–}id \quad chan^{1}\left[\{\pm\}chan^{2}\ \left[\{\pm\}chan^{3}\ldots\{\pm\}chan^{4}\right]\right] \quad [\,start-time\,] \quad [\,TOU\ schedule\,] \quad [\text{ /*comment}]$$

Environment File Record Format

TGY37B.ENV (for ELDB data) or TGX37B.ENV (for CLDB data)

DATe [**CUT** | *start-time stop-time* [**MONthly** [**SUMmary**]]]

AGGregate [*n* | 0]

ROLling *n* [‘*q*’ | ‘8’]

MERge [**YES** | **NO**]

QUAlity [‘*q*’ | ‘8’]

PROrate [**YES** | **NO**]

SCHedule [**DEMand** | *t* | 0]

SEAson [*s* | 0]

PEAk *peak-time*

GROup *title*

PAGinate [**NO** | **YES**]

TOUreport [**NO** | **YES**]

AVGreport [*Avg1* [,*Avg2* [,*Avg3* ....[,*Avg8*]]] | **NO** | **COMplete**]

WRIte [**TOU** | **AVErage** | **NO** | **COMplete**] [**SEParate**]*
* **SEP** option is not valid when **NO** is specified.

DEScriptor [**NO** | **YES**] [*‘t1’, x1-y1,’t2,x2-y2.....*]

You may include optional comments at the end of an Environment File Command. Begin comments with “/”.*

Average Day Type Statistics Abbreviations

(Used in the Environment File AVGREPORT Command)

AD	Average day
ADX	Average day, excluding holidays
WD	Average weekday
WDX	Average weekday, excluding holidays
WN	Average weekend
WNX	Average weekend, excluding holidays
WEH	Average weekend and holidays
WDH	Average weekday holiday
WNH	Average weekend holiday
SUN	Average Sunday
MON	Average Monday
TUE	Average Tuesday
WED	Average Wednesday
THU	Average Thursday
FRI	Average Friday
SAT	Average Saturday
MAX	Day of Maximum
MIN	Day of Minimum
DEM	Average Demand Period*
P01-P25	Day of Supplied Peak X

** The Average Demand Period statistic may be calculated and reported if you have a Demand Period File, regardless of whether you apply a TOU Schedule to the analysis.*

Demand Period File Record Format

TGY37E.DEM

date start-time^{1} stop-time^{1} start-time^{x} stop-time^{x}

Time-Of-Use Schedule File Record Format

TGY31D.TOU

Schedule Period Day-list Time-range [Comment]

Holiday File Record Format

TGY31C.HOL

mm/dd/yy

Oracle Utilities Load Analysis Status Codes

Status Code	Classification of Interval Data
’ ’	Normal
’A’	Normal, alternate-recorded (e.g., hand-entered)
’J’	Data inserted by Load Analysis to correct outage
’L’	Default for data modified by Load Data Editor
‘N’	Interruptible or curtailable load
’P’	Inserted outage
’Q’	Corrected outage
‘X’	Cuts resulting from merging invalid data or from unrecognized status codes.
’Y’	Reserved
’1’	Uncorrected outage (also called loss of potential)
’2’	Non-normal (usually timing-pulse defects)
’5’	Aggregated interval used in rolling format with partially missing or unavailable data
’7’	Aggregated or transformed internal with partially missing data
’9’	Missing

Chapter 21

Oracle Utilities Load Analysis Proxy Day Selection Program (X670)

This document describes the Proxy Day Selection Program, which selects a historical day (Proxy Day) whose load shape most accurately represents a supplied day's load shape. This selected day, in conjunction with the Cost of Service Interface, can be used to perform daily reconciliation for the estimation of aggregated suppliers' load profiles. This program is included with the optional Analysis Bundle.

Topics included in this chapter are:

- **What Does The Proxy Day Selection Program Do?**
- **Eligibility Testing**
- **Ranking of Eligible Days**
- **Creating the Environment File (TGX67B)**
- **Program Outputs**
- **Proxy Day Return Codes**
- **Proxy Day Return Code List**

What Does The Proxy Day Selection Program Do?

The Proxy Day Selection Program is designed to select a historical day (Proxy Day) whose load shape most accurately represents a supplied day's load shape. This selected day, in conjunction with the Cost of Service Interface or LPSS, can be used to perform daily reconciliation for the estimation of aggregated suppliers' load profiles.

You can select a proxy day based on a supplied daily load shape. The program will find a daily load shape stored in a Oracle Utilities Load Analysis Interval database that most closely matches the daily load shape you supply. The program runs against either one or two Oracle Utilities Load Analysis Interval databases. Optional temperature data may be contained in either the same database as the load data or a separate database.

Eligibility Testing

Potential proxy days are first screened for eligibility according to criteria established in the Environment File or by default. These criteria include an eligible date range, day type, holiday status, season, peak time separation, and difference of average or maximum temperature.

The optional temperature check requires a temperature cut series (Oracle Utilities Load Analysis unit of measure = 05, 13, 35, or 43) covering the same date range as the load data to be checked, and identified by a user-supplied cut series key. If only one temperature series key is provided, the same temperature series is used for both the supplied load shape day and potential proxy days; alternatively, a second temperature series may be specified for use with potential proxy days only. The temperature check calculates the average or maximum temperature of the supplied load shape day, and compares this value to the corresponding temperature data (average or maximum) for each potential proxy day. The user sets the acceptable difference in degrees between the calculated value for a potential proxy day and that for the supplied load shape day. Missing data in a day's temperature subset will be flat-lined from the preceding non-missing value until the next non-missing temperature value is found.

The temperature cut must be of the same unit of measure (UOM) over the entire date range, and be stored in one interval database. If two temperature series are specified, their UOMs must be compatible. The Oracle Utilities Load Analysis database containing temperature data is an interval database, and can be the same database as that containing the load data or a different database.

Ranking of Eligible Days

Each potential proxy day found eligible according to the preceding criteria will be tested for conformity with the load shape of the supplied day as follows:

Magnitude

This test compares similar interval values in energy units and sums the squared differences between the corresponding hours of the supplied day and the potential proxy day.

The formula for magnitude calculation is:

(where EPD is Eligible Proxy Day and SPD is Supplied day)

1. Sum of the squared differences of each interval (t) for the number of intervals (n) in the day:

$$\sum_{t=1}^{n} (\text{SPD Interval}_t - \text{EPD Interval}_t)^2$$

2. To rank the sum of squared differences calculated for each EPD when compared to the SPD, the EPD with the minimum sum has the best fit under the magnitude test.

Shape

This test will calculate the incremental load over the previous hour and sum the squared differences between the corresponding values of the supplied day and the potential proxy day.

The formula for shape calculation is:

1. Calculate the Shape Difference (SD) of each interval between a day and the lag intervals of that day.

   $\text{SPD SD} = \text{SPD interval}_t - \text{Lag(SPD Interval}_t)$

   $\text{EPD SD} = \text{EPD Interval}_t - \text{Lag(EDP Interval}_t)$

2. Sum the squared differences in SD of each interval (t) for the number of intervals(n) in the day:

$$\sum_{t=1}^{n} (\text{SPD SD}_t - \text{EPD SD}_t)^2$$

Lag intervals are defined by finding the difference between the nth and the (nth - 1) interval of the cut series. The first calculation needs the interval before the date range, i.e., the interval ending 01:00 (if 60-minute interval data is used) for each day needs the previous interval located in the preceding day.

1. To rank the sum of squared differences calculated for each EPD when compared to the SPD in shape difference, the EPD with the minimum sum has the best fit under the shape test.

Creating the Environment File (TGX67B)

Selection and ranking criteria for potential proxy days are determined by the following Environment File commands:

DATe *start-time stop-time*

KEY *custid*, *channel*, *start-time*

PROxy *custid*, *channel*

DAYtype [**DT** | **DOW** | **ANY**]

HOLiday

PEAk [**MINutes**]

SEAson *s*

TEMp *skey* [*pkey*]

DEG #*degrees* [**AVG** | **MAX**] [**MISsing** #*hours*]

NUM *n*

MAGnitude [*weight*]

SHApe [*weight*]

INEligible

MERge [**YES** | **NO**]

OUTput [**CSV** | **LSE** | **XML** | **GRAph**]

Figure 20-1 Proxy Day Environment File Commands

DATe *start-time stop-time*

DATe — *(required)*. The day selected will be within a user specified date range. The minimum date range is one month; the maximum is 36 months. The start time is at 00:00:00 and the stop time is at 23:59:59; (full days); any other hours, minutes, and seconds specified will be ignored. The DATe format is mm/dd/yy.

KEY *custid*, *channel*, *start-time*

KEY — *(required).* Indicates to the program the supplied load shape day to be matched in the selection process. A full day is used; any hours, minutes, and seconds other than 00:00:00 will be ignored.

PROxy *custid*, *channel*

PROxy — *(optional).* Indicates to the program the proxy cut series to search. If this command is omitted, the cut series of the supplied load shape day will be used.

DAYtype [**DT** | **DOW** | **ANY**]

DAY — *(optional).* This command specifies whether the proxy day selected must be of the same day type as the supplied load shape day in the following criteria:

> Day of Week, Weekend/Weekday, Any (no day type test)

The following describe each selection:

DT — Proxy day matches day type (weekday or weekend)

DOW — Day of week matches exactly (mon=mon)

ANY — Any day type qualifies (no checking). ANY is the default.

HOLiday

HOLiday checking — *(optional).* If HOL is entered, holiday checking will be performed; the program may select only potential proxy days with holiday status matching that of the user-supplied day. Up to 100 holidays may be defined over the selection period in the Oracle Utilities Load Analysis Holiday File; you *must* specify a Holiday File if HOL is specified in the Command File. If not specified, no holiday checking will be performed (holidays will be treated the same as non-holidays in terms of eligibility), and the Holiday File will not be used. You must specify a Holiday File in the Submit panel.

PEAk [**MINutes**]

PEAk separation — *(optional).* The proxy day selected must have its peak time within a user-specified number of minutes of the peak time in the supplied load shape day. If this command is not specified or is specified without a value, the default is 60 minutes.

> **m** — minutes allowed between proxy day peak time of day and that of supplied day.
>
> **60** — is the default.

SEAson *s*

SEAson checking — *(optional).* If SEA is entered with a Season Schedule number, season checking will be performed; the proxy day selected must be in the same season as the supplied load shape day. The seasons are defined in the Oracle Utilities Load Analysis Season File. If this command is not entered, no season checking is performed, and the Season File is not accessed.

TEMp *skey* [*pkey*]

TEMp checking — *(optional).* There are two separate commands for temperature checking (TEM and DEG). If one is specified, both must be specified.

The TEMp command may specify either one or two temperature cut series:

skey — skey is the key (custid/channel) of the temperature cut series providing temperatures for the supplied load shape day.

pkey — pkey is the key of the cut series providing temperatures for the potential proxy day series. If this key is omitted, the skey series will be used to find temperatures for both the supplied load shape day and the potential proxy day series.

DEG *#degrees* [**AVG** | **MAX**] [**MISsing** *#hours*]

DEG — This must be specified if the TEMp command is used.

#degrees — indicates the number of degrees by which a potential proxy day's temperature may differ from the supplied load shape day's. DEG must be a non-negative integer.

AVG or **MAX** — define which test is to be performed. If AVG is selected, the average temperatures of the potential proxy day and the supplied load shape day will be compared; if MAX is selected, their maximum temperatures will be compared. MAX is the default.

MIS #hours — is the maximum number of hours in the temperature data for any one day that may be missing (status '9') and the temperature eligibility test still be performed. This must be a whole number from 0 to 23; the default is 23 if this number is not specified (i.e., only if all 24 hours of any day's temperature data are missing will temperature testing be bypassed).

NUM *n*

NUM Reported — *(optional).* **n** is an integer between 1 and 20. The default is 1. The program will report up to the top 20 ranked proxy days with their associated ranking values. However, no more days will be reported than meet the specified eligibility criteria.

MAGnitude [*weight*]

MAGnitude weight — *(optional).* **w** is 1, 0, or a decimal fraction representing a number of tenths, such as .3 or 0.3. This command indicates to the program what weight to assign to the magnitude test described earlier.

SHApe [*weight*]

SHApe weight — *(optional).* **w** is 1, 0, or a decimal fraction representing a number of tenths. This command indicates to the program what weight to assign to the shape test described earlier.

> **Note:** You may specify which tests are to be performed and give a weight to each test. Precision is in tenths. If a weight value is not entered, 1 is assumed. If only one test is selected and no weight is specified, the weight value for that test is defaulted to 1 and the other test is not performed. If only one test is selected and a weight is specified, the weight value for the other test is defaulted to (1 – the specified weight). If both tests are selected, the sum of the two weights must equal 1. If neither of the tests is specified in the Environment File, both tests will be performed with equal weights (.5).

INEligible

INEligible — *(optional).* Code this command if you wish to produce the Ineligible Days Report, which lists each day within the date range that did not pass eligibility criteria, along with a message indicating the eligibility test that it failed.

MERge [**YES** | **NO**]

MERge— An optional command. When set to "YES", the program will merge all cuts found within the specified date range regardless of validation status. When set to "NO" (default), the program will reject invalid cuts and return an error message indicating the cuts are not merge-able.

OUTput [**CSV** | **LSE** | **XML** | **GRAph**]

OUTput— An optional command. Specifies the output format for the program. User can specify CSV (comma-separated output), LSE, XML, or GRAph. The use of GRAph will allow you to graphically view the selected proxy days and the supplied day.

Program Outputs

The program produces an Environment File Report and a Summary Report listing the selected proxy day(s) with ranking factor(s). In addition, it writes to output file TGX671 a single 80-character record consisting of a DATe Command defining the best-ranked proxy day selected, suitable for use by a load data extraction program such as Direct Output (X720/Y720) or Cost Of Service Data Extraction (G120). An example of the output file record:

```
DATE 04/23/97-00:00:00 04/23/97-23:59:59 (from X670)
```

Proxy Day Return Codes

This document lists the return codes (including error codes) provided by the Proxy Day Selection Program.

Proxy Day Return Code List

The table below lists the return codes (including error codes) provided by the Proxy Day Selection Program.

Return Code	Error
03	UNABLE TO OPEN TEMPERATURE DATABASE. REQUESTED TEMPERATURE TESTING NOT PERFORMED.
04	PROBLEM GETTING TEMPERATURE DATA. REQUESTED TEMPERATURE TESTING NOT PERFORMED.
05	INSUFFICIENT TEMPERATURE DATA FOR ONE OR MORE PROSPECTIVE PROXY DAYS. REQUESTED TEMPERATURE TESTING NOT PERFORMED.
06	UOM FOR PROXY TEMPERATURE CUT SERIES INCOMPATIBLE WITH THAT FOR SUPPLIED LOAD SHAPE DAY. REQUESTED TEMPERATURE TESTING NOT PERFORMED.
07	NON-TEMPERATURE UOM CODE IN PROXY TEMPERATURE CUT SERIES. REQUESTED TEMPERATURE TESTING NOT PERFORMED.
08	UOM CODE NOT CONSISTENT THROUGHOUT PROXY TEMPERATURE CUT SERIES. REQUESTED TEMPERATURE TESTING NOT PERFORMED.
10	INVALID START DATE
11	INVALID STOP DATE
12	STOP DATE DOES NOT FOLLOW START DATE
13	SELECTION RANGE MUST BE AT LEAST 1 MONTH LONG.
14	SELECTION RANGE MUST NOT EXCEED 3 YEARS.
15	MISSING SUPPLIED LOAD SHAPE DAY KEY
16	SUPPLIED LOAD SHAPE DAY CUSTOMER ID IS INVALID.
17	SUPPLIED LOAD SHAPE DAY CHANNEL IS INVALID.
18	NO DATE IN SUPPLIED LOAD SHAPE DAY KEY.
19	SUPPLIED LOAD SHAPE DATE IS INVALID.
20	PROXY SERIES KEY MISSING.
21	NO CHANNEL SUPPLIED FOR PROXY SERIES KEY.
22	PROXY SERIES KEY CHANNEL IS INVALID.

Return Code	Error
23	PROXY SERIES KEY IS INVALID.
24	INVALID NUMBER OF PROXY DAYS: MUST BE 1-20.
25	SEASON SCHEDULE MUST BE A NON-NEGATIVE INTEGER.
26	MISSING TEMPERATURE SERIES KEY(S).
27	NO CHANNEL SUPPLIED FOR TEMPERATURE SERIES KEY.
28	TEMPERATURE SERIES KEY CHANNEL IS INVALID.
29	TEMPERATURE SERIES KEY IS INVALID.
30	NO CHANNEL SUPPLIED FOR TEST SERIES TEMPERATURE KEY.
31	TEST SERIES TEMPERATURE KEY CHANNEL IS INVALID.
32	PROXY SERIES TEMPERATURE KEY IS INVALID.
33	INVALID TEMPERATURE DEGREES DIFFERENCE.
34	INVALID TEMPERATURE DEGREES TEST TYPE.
35	TEMPERATURE TEST MISSING INTERVAL THRESHOLD MUST BE N INTEGER FROM 0 TO 23.
36	INVALID PARAMETER AFTER TYPE ON DEG COMMAND.
37	INVALID DAY COMPARISON TYPE: MUST BE DOW, DT, OR ANY.
38	MINUTES ALLOWED BETWEEN PEAKS MUST BE 0-1440.
39	INVALID MAGNITUDE TEST WEIGHT: MUST BE BETWEEN 0 AND 1.
40	INVALID SHAPE TEST WEIGHT: MUST BE BETWEEN 0 AND 1.
41	UNKNOWN ENVIRONMENT FILE COMMAND.
42	A SELECTION DATE RANGE IS REQUIRED.
43	NO KEY WAS ENTERED FOR SUPPLIED LOAD SHAPE DAY.
44	A TEMPERATURE DEGREES TEST WAS SPECIFIED, BUT NO TEMPERATURE CUT SERIES KEY WAS SUPPLIED.
45	A TEMPERATURE CUT SERIES KEY WAS SUPPLIED, BUT NO TEMPERATURE DEGREES TEST WAS SPECIFIED.
46	SUM OF WEIGHTS SPECIFIED FOR MAGNITUDE AND SHAPE TESTS NOT = 1.
48	NUMBER OF HOLIDAYS IN SELECTION DATE RANGE EXCEEDS MAXIMUM (200).

Return Code	Error
49	INVALID DATE ON LINE XX OF HOLIDAY FILE. (where XX is the line number of the holiday file)
50	HOLIDAY FILE NOT SUPPLIED OR REQUESTED HOLIDAY FILE NOT FOUND.
51	SEASON SCHEDULE NOT USABLE OVER SELECTION DATE RANGE.
52	REQUESTED SEASON SCHEDULE NOT FOUND OR NOT USABLE FOR SUPPLIED LOAD SHAPE DAY.
60	UNABLE TO OPEN INTERVAL DATABASE.
61	PROBLEM GETTING SUPPLIED LOAD SHAPE DAY ENERGY
70	UOM CODE FOR PROXY DATA CUT SERIES INCOMPATIBLE WITH THAT FOR SUPPLIED LOAD SHAPE DAY.
71	UOM CODE IS NOT CONSISTENT THROUGHOUT PROXY DATA CUT SERIES.
80	NO QUALIFIED PROXY DAY FOUND IN PROXY DATA CUT SERIES.
101	DATA FOR SUPPLIED LOAD SHAPE DAY SERIES STOPS BEFORE REQUESTED DAY.
102	DATA FOR SUPPLIED LOAD SHAPE DAY SERIES STARTS AFTER REQUESTED DAY.
110	RECORDS FOR SUPPLIED LOAD SHAPE SERIES DO NOT SATISFY MERGE CRITERIA.
111	LOAD DATA FOR SUPPLIED LOAD SHAPE DAY CONTAINS ALL MISSING INTERVALS.
112	ENVIRONMENT ERROR
113	SEASON ERROR
114	HOLIDAY ERROR
151	NO DATA FOUND FOR SUPPLIED LOAD SHAPE DAY SERIES.
160	LOAD DATA NOT AVAILABLE FOR INTERVAL BEFORE SUPPLIED LOAD SHAPE DAY: SHAPE TEST CANNOT BE PERFORMED.
162	UNIT-OF-MEASURE CODE FOR PROXY DATA CUT SERIES INCOMPATIBLE WITH THAT FOR SUPPLIED LOAD SHAPE DAY.
164	UNIT-OF-MEASURE CODE IS NOT CONSISTENT THROUGHOUT PROXY DATA CUT SERIES

Return Code	Error
201	TEMPERATURE DATA NOT AVAILABLE FOR INTERVAL BEFORE SUPPLIED LOAD SHAPE DAY. TEMPERATURE ELIGIBILITY TEST WILL NOT BE PERFORMED.
202	ALL TEMPERATURE DATA FOR DAY BEFORE SUPPLIED LOAD SHAPE DAY IS MISSING. TEMPERATURE ELIGIBILITY TEST WILL NOT BE PERFORMED.
210	TEMPERATURE SERIES RECORDS FOR SUPPLIED LOAD SHAPE DAY DO NOT SATISFY MERGE CRITERIA.
215	NON-TEMPERATURE UNIT-OF-MEASURE CODE IN SUPPLIED LOAD SHAPE DAY TEMPERATURE CUT.
251	NO TEMPERATURE DATA FOUND FOR SUPPLIED LOAD SHAPE DAY.
260	MISSING TEMPERATURE INTERVALS FOR SUPPIED LOAD SHAPE DAY.
261	INSUFFICIENT TEMPERATURE DATA FOR ONE OR MORE PROSPECTIVE PROXY DAYS.
262	UNIT-OF-MEASURE CODE FOR PROXY TEMPERATURE CUT SERIES INCOMPATIBLE WITH THAT FOR SUPPLIED LOAD SHAPE DAY
263	NON-TEMPERATURE UNIT-OF-MEASURE CODE IN PROXY TEMPERATURE CUT SERIES.
264	UNIT-OF-MEASURE CODE IS NOT CONSISTENT THROUGHOUT PROXY TEMPERATURE CUT SERIES.
299	INSUFFICIENT TEMPERATURE DATA AVAILABLE IN PROXY TEMPERATURE CUT SERIES.
300	INSUFFICIENT TEMPERATURE DATA FROM DAY BEFORE SUPPLIED LOAD SHAPE DAY TO FILL MISSING FIRST INTERVAL(S).
301	SERIES DATA STOPS BEFORE DAY.
302	SERIES DATA STARTS AFTER DAY.
303	WRONG DAY OF WEEK.
304	INCORRECT DAY OF WEEK
305	NOT A HOLIDAY.
306	IN SEASON.
307	PEAK ENERGY TIME 'X' MINUTES FROM SUPPLIED DAY PEAK TIME.
308	THIS IS THE SUPPLIED LOAD SHAPE DAY.
310	RECORDS FOR DAY DO NOT SATISFY MERGE CRITERIA.
311	DAY CONTAINS ALL MISSING INTERVALS.

Return Code	Error
351	NO DATA FOUND FOR THIS DAY.
360	MAXIMUM AVERAGE TEMPERATURE DIFFERS FROM SUPPLIED DAY'S BY 'X' DEGREES.
400	LOAD DATA NOT AVAILABLE FOR INTERVAL BEFORE DAY.
904	INTERVAL DATA ERROR (specific message is based on the specific type of error).
999	NO PROSPECTIVE PROXY DAYS MEET SELECTION CRITERIA.

Appendix A

Glossary of Load Research Terms[1]

Term	Definition
Actual Demand	See demand.
All-Electric Home	A home in which electricity is the principal source of energy for space heating and cooling, water heating, cooking, lighting, and other power requirements.
Ampere	Unit of measurement of electric current. It is the unit of current produced in a circuit by one volt acting through a resistance of one ohm. It is analogous to cubic feet of water per second.
Annual	Pertaining to any 12 consecutive calendar months.
Appliance Saturation	Ratio of the number of appliances to the total number of customers in the group, expressed as a percentage.
Appliance-Customer Saturation	Ratio of the number of customers having a stated appliance to the total number of customers in the group, expressed as a percentage.
Average Demand	See demand.
Average Use, kWh	Total kilowatt-hour use for a group of customers in a specific period (year, month, day) divided by the average number of customers in the group for the same period. Average monthly use is 1/12 of the annual average use.
Average Weekday	Monday through Friday.
Average Weekend	Saturday and Sunday.
Class of Service	A classification based on type of customer, service characteristic, type of equipment, or ultimate energy use. More common designations include: rural, residential, commercial, primary distribution, large (or small) light and power, manufacturing, non-manufacturing, and general service.

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[1] Many of these definitions are taken from *Load Research Manual*, Vol. 2, (ANL/SPG-13) prepared by the Argonne National Laboratory.

Term	**Definition**
Clock Hour	The 60-minute interval ending at any standard hour, usually indicated by the beginning and ending hours (6 - 7 p.m.) or as hour ended (7 p.m.).
Coincidence Factor	The ratio, in percent, of the maximum demand of a group, class, or system as a whole to the sum of the individual maximum demands of the components of the group, class, or system. As defined, coincidence factor is the *reciprocal of the diversity factor* and *can never be greater than 100%.*
Coincident	Used only to express events occurring over the same time interval, as in "demand coincident with ..." Equivalent to "diversified demand."
Commercial	A classification covering rates, service, or use for commercial purposes.
Connected Load	The sum of the continuous ratings of the electric power-consuming apparatus connected to a system, part of a system, or customer, usually expressed in kilowatts.
Customer	An individual, firm, or organization who purchases electric service at one location under one class of service.
Daily	Pertaining to any 24 consecutive hours, usually midnight to midnight.
Degree-Day (Hour)	See Temperature - Degree-Day (Hour).
Demand	The rate at which electric energy is delivered at a given instant or averaged over a designated time interval such as **15, 30, or 60 minutes**. It may be expressed in kilowatts, kilovolt-amperes, or other units for a system, group of customers, or on a per customer basis.
Actual Demand	Registered demand.
Average Demand	Kilowatt-hours divided by hours. May be expressed as kilowatt-hours per hour.
Billing Demand	The demand upon which the billing is based as specified in a rate schedule. The billing demand may be greater or less than the actual demand for the billing period.
Coincident Demand	The simultaneous demands of a group of appliances or customers taken as a whole. Coincident demands may be determined by direct measurement or by the addition of the load curves of the individual appliances or customers in the group.
Demand Factor	The ratio, in percent, of the maximum demand of a system, part of a system, or individual customer or application to the total connected load of that system, part of system, customer, or application under consideration.
Demand Interval	The period of time during which the energy flow or load is averaged in determining effective demand, such as 15, 30, or 60 minutes. *May be approximated by multiplying the energy in the interval by the number of intervals per hour.*

Term	Definition
Diversified Demand	Coincident demand.
Group Demand	Coincident demand.
Individual Customers’ Maximum Demand	The sum of the maximum demands of two or more customers, usually expressed on a per customer basis. See non-coincident maximum demand.
Integrated Demand	The demand averaged over a specific period, usually determined by an integrating meter or by the integration of a load curve. It is the average of the continuously varying instantaneous demand during a specified interval.
Kilovolt-Ampere Demand	The average kilovolt-ampere demand in a specific time interval. The kilovolt-ampere demand multiplied by power factor is equivalent to the kilowatt demand for the same time interval.
Maximum Demand	The highest integrated demand of the load under consideration occurring during the specified period of time. The demand may be diversified or non-coincident and may be expressed as a total for a group or on a per customer basis. It may be for a daily, weekly, monthly, or annual period.
Non-Coincident Maximum Demand	The maximum demand of any appliance, customer, group, class, or system within a specified period (day, week, month, year) regardless of time of occurrence.
Peak Demand	Maximum demand.
System Maximum Demand	Maximum demand of an entire system. It is the maximum diversified demand of all classes of customers including losses measured at the point of total system supply.
System Peak Demand	System maximum demand.
Demand Factor	See demand.
Demand Interval	See demand.
Design Temperature Difference	See Temperature - Design Temperature Difference.
Diversified Demand	See demand.
Diversity Factor	The ratio of the sum of the individual maximum demands of the components of a group, class, or system to the maximum diversified demand of the group, class, or system as a whole. The diversity factor is the reciprocal of the coincidence factor and as defined *can never be less than unity.*
Dry Bulb Temperature	See Temperature - Dry Bulb Temperature.
Effective Degree-hour	See Temperature - Effective Degree-Hour.
Energy	The kilowatt-hours supplied to or used by an individual customer, average customer, group of customers, or class of service. Energy use may be determined by measurement or by calculation.

Term	Definition
Group	A sample forming a recognizable unit based on a common characteristic determined by the type of study involved, e.g., class of service, size of demand or energy use, load factor.
Group Demand	See demand.
Individual Customer's Maximum Demand	See demand.
Industrial	A classification covering service for industrial use.
Integrated Demand	See demand.
Kilovolt-Ampere Demand	See demand.
Large Light and Power	A customer, sales, or revenue classification covering electric energy supplied to customers for commercial and industrial purposes. This classification includes customers whose demand exceeds 50 kW, and/or whose annual energy use exceeds 100,000 kWh.
Load	The amount of power delivered or received at a given point over a specific time interval. It may apply to a total system, a part of a system, an individual customer, or group of customers.
Load Characteristics	Collectively, all or part of the features of the electric service rendered, including: energy use, demand, time of occurrence, coincidence factor, demand factor, load factor, and similar derivable relationships.
Load Curve	As applied to a customer, group of customers, class, or system, a load curve is a curve (usually plotted point to point) showing the power supplied during a specified period of time as plotted against the time of occurrence. Demands may be expressed in watts, kilowatts, kilovolt-amperes, or as a percentage of the average or maximum load during the period in question. Time units may be 15, 30, or 60 minutes. Load curves normally cover a 24-hour period for a specific or average day and are plotted midnight to midnight.
Load Diversity	The variation between the sum of the peaks of two or more individual loads and the peak of their combined load.
Load Duration Curve	A curve showing the total time (or percentage of time) within a specified period during which the load equaled or exceeded the power values shown.
Load Occurrence Curve	A curve relating load in percent of annual peak to cumulative energy output in percent of annual total.

Term	Definition
Load Factor	The ratio, in percent, of the average demand over a designated period of time to the maximum demand occurring in that period. Load factor is derived by the formula: $\frac{(\text{kWh in period}) \times 100}{(\text{max demand in kW}) \times (\text{hrs in period})} = \text{load factor (in percent)}$ (kWh in period) x 100 = load factor (max demand in kW) x (hrs in period) (in percent). Load factor may refer to customer, appliance, group, class, or system loads and may cover a daily, weekly, monthly, or annual period.
Major Appliance	Electrical appliance having a high energy use and relatively high connected load, normally occupying a fixed location on a customer's premises, e.g., clothes dryer, range, refrigerator, freezer, air conditioner, and water heater.
Manufacturing	A classification covering service for manufacturing uses, identified as Division D in the Standard Industrial Classification Manual, Office of Management and Budget, 1972.
Maximum Demand	See demand.
Mean Daily Temperature	See Temperature - Mean Daily Temperature.
Non-Coincident Maximum Demand	See demand.
Non-Manufacturing	A classification covering all major groups in the Standard Industrial Classification Manual, Office of Management and Budget, 1972, except those identified as manufacturing, Division D. See "manufacturing."
Off-Peak	Energy supplied during periods of relatively low system demand as specified by the supplier.
Ohm	The unit of resistance in electric currents.
On-Peak Demand Register	A register that will record both the total energy used and the maximum peak demand. The demand recording is controlled by a solenoid-operating demand gear train that may be actuated locally or remotely.
Output, System	Net energy generated by a system's own plants plus energy received from other systems minus energy delivered to other systems.
Peak Demand	See demand.
Peak Responsibility	The load of an appliance, customer, group of customers, class, or part of a system coincident (in time) with the peak demand of the group, class, or system.

Term	Definition
Peak Responsibility Factor (Contribution Ratio)	The ratio of the average demand over a designated period of time, of an appliance, customer, group of customers, class, or part of a system to a specific peak responsibility of the appliance, customer, group of customers, class, or part of a system.
Peak Splitting	The splitting of peak load over two adjacent demand intervals.
Power Factor	The ratio of real power (watts) to apparent power (volt-amperes) for any given load and time; usually expressed as a percentage.
Q Hour	Reactive voltampere-hour; voltampere is a unit of apparent power.
Residential	A customer, sales, or revenue classification covering electric energy supplied for residential (household) purposes.
Rural	A rate classification covering electric energy supplied to rural and farm customers (under distinct rural rates).
Sampling - Area Method of Testing	Testing a group of customers within a contained area at a common energy supply point to determine diversified load characteristics. For load research purposes, customers within the test area should be relatively homogeneous as to class of service and size.
Sampling - Random Sample	A sample drawn in such a way to ensure that each and every sample unit has the same chance of being selected.
Sampling - Test Sample	The total group of customers or appliances chosen for test by approved methods of sample selection.
Service Area	The territory in which a utility is required or has the right to supply electric service to ultimate customers.
Status Code	A value accompanying each data interval that indicates the relative quality of the data.
Stratification	The process by which a population is divided into non-overlapping segments called strata that together compose the entire population.
Survey Period	The entire period during which the load characteristics are studied.
System Maximum Demand	See demand.
System Peak Demand	See demand.

Term	Definition
Temperature - Degree-Day (Cooling)	(a) A unit measuring the extent to which the outdoor mean daily dry-bulb temperature rises above an assumed base for each calendar day on which such excess occurs. (b) A unit representing the excess of the daily temperature-humidity index (THI) over an assumed base. The daily average of 24 hourly values of dry-bulb temperatures and dew point readings are used in the equation. One degree-day is counted for each degree of excess over the assumed base for each calendar day on which such an excess occurs. (c) Degree-quarter-day (cooling) is a unit representing the excess of the average of four temperature-humidity index (THI) values, taken at six-hour intervals, over an assumed base. One degree-day is counted for each degree of excess over the assumed base for each calendar day on which such excess occurs.
Temperature - Degree-Day (Heating)	A unit measuring the extent by which the outdoor mean daily dry-bulb temperature falls below an assumed base. One degree-day is counted for each degree of deficiency below the assumed base for each calendar day on which such deficiency occurs.
Temperature - Degree-Hour (Cooling)	(a) A unit measuring the extent to which the outdoor hourly temperature rises above an assumed base. One degree-hour is counted for each degree of excess over the assumed base for each hour in which such excess occurs. (b) A unit measuring the extent to which the hourly effective degree-hour rises above an assumed base. One degree-hour is counted for each degree of excess over the assumed base for each hour in which such excess occurs.
Temperature - Degree-Hour (Heating)	A unit measuring the extent to which the outdoor hourly temperature falls below an assumed base. One degree-hour is counted for each degree of deficiency below the assumed base for each hour in which such deficiency occurs.
Temperature - Design Temperature Difference	In heat loss calculations, the difference between potential minimum outdoor temperature during the heating season and normal indoor temperature maintained by the customer. The value varies from area to area throughout the United States.
Temperature - Dry Bulb	Temperature indicated by a thermometer with the bulb dry; usually in degrees Fahrenheit.
Temperature - Effective Degree-Hour (Cooling)	An empirical index of relative air cooling requirements. Unless otherwise determined, it can be calculated by applying a weight of 1.0 to the dry-bulb degree-hours and 2.0 to the wet-bulb degree-hours for a specified period (day, week, month, or cooling season).
Temperature - Mean Daily Temperature	The average of the high and low temperatures recorded during a 24-hour period taken from midnight to midnight.

Term	Definition
Temperature-Humidity Index	A term used by the United States Weather Bureau to indicate the combination of temperature and air moisture that causes diverse sensations of comfort and discomfort in human beings. The temperature-humidity index (THI) values (dry bulb — dew point calculation) are derived from the formula: $THI = 0.55t_d + 0.2t_{tp} + 17.5$, where t_d is the hourly dry-bulb temperature and t_{tp} is the dew point temperature reading. Other formulas may be used, depending on the data available. Based on dry-bulb (t_d) and wet-bulb (t_w) temperatures, $THI = 0.4(t_d + t_w) + 15.0$. Based on dry-bulb Temperature (T_d) And Relative Humidity (Rh), $Thi = T_d - (0.55 - 0.55\ Rh)(T_d - 58.0)$.
Temperature - Wet Bulb	The temperature indicated by a thermometer with the bulb covered by a wet wick when in relative motion to the air (sling psychrometer). Used in connection with cooling only.
Temperature-Humidity Index	See Temperature - Temperature-Humidity Index.
Test Period	The period during which actual measurements of the load under study are being made. Specific dates for the test periods of both energy use and demand measurements should be indicated.
Time-of-Day Metering	A method or system for recording kilowatt-hours consumed or a maximum demand established during both a specified period of time (on-peak) and the entire day.
Use	Energy use in kilowatt-hours; may be hourly, daily, weekly, monthly, bimonthly, quarterly, or annual.
Volt	The unit of electromotive force that, if steadily applied, will cause a current of one ampere to flow through a conductor whose resistance is one ohm.
Volt-Ampere	The mathematical product of one volt and one ampere; in a direct current, it is equal to one watt.
Watt	The unit of electric power equivalent to one ampere flowing under a pressure of one volt at unity power factor.
Watt-Hour	Unit of electric energy expended in one hour when the power is one watt.
Wet Bulb	See Temperature - Wet Bulb.

Appendix B

Analysis Equations

Load Analysis Programs

This appendix documents the calculations used in three Oracle Utilities Load Analysis Load Data Analysis programs:

> Standard Load Analysis — class load analysis of non-stratified (Section B.1) and stratified (Section B.2) samples using the mean-per-unit expansion technique
>
> 100% Sample Analysis — class load analysis of populations that are 100% sampled where no expansion is performed (Section B.3)
>
> Aggregate Load Analysis — combining only sampled classes using mean-per-unit expansion (Section B.4) and combining sampled and 100% sampled classes (Section B.5).

Finally, average day statistics are discussed (Section B.6). The material presented in this appendix assumes a basic understanding of statistics, load research calculations, and Oracle Utilities Load Analysis's operation.

B.1 Non-Stratified Std. Load Analysis Equations (Mean-per-Unit)

Let:

r = index for each customer, $r = 1, 2, ..., R$;
t = index for each time, $t = 1, 2, ..., T$;
N = population size;
$d_{r,t}$ = r-th customer's demand (kW) for time t;
$c_{r,t}$ = r-th customer's status code (hexadecimal) for time t;
C = worst acceptable status code (hexadecimal);
a = level of significance;
$t_{a/2}$ = Student's t-variate.

Define:

$$x_{r,t} = \begin{cases} 1 \text{ if } c_{r,t} \le C; \\ 0 \text{ otherwise.} \end{cases}$$

STATISTIC	FORMULA
Sample size:	$n_t = \sum_r X_{r,t}$

STATISTIC	**FORMULA**
Sample mean:	$\bar{d}_t = \sum_r d_{r,t} * x_{r,t} / \mathrm{n}_t$
Sample standard deviation	$d_t = \sqrt{\sum_r (d_{r,t} * \mathrm{x}_{r,t} - \bar{d}_t)^2 / (n_t - 1)}$
Standard error of sample mean:	$se(\bar{d}_t) = \sqrt{(1 - n_t / N) * (sd_t^2 / n_t)}$
Class total:	$D_t = N * \bar{d}_t$
Standard error of class total:	$se(D_t) = N * se(\bar{d}_t)$
Degrees of freedom:	$df_t = n_t - 1$
Relative precision:	$P_t = (se(\bar{d}_t) / \bar{d}_t) * t_{a/2, df_t}$

B.2 Stratified Standard Load Analysis Equations (Mean-per-Unit)

Let:

s = index for each stratum, s = 1, 2, ..., S;
r = index for each customer, r = 1, 2, ..., R_s; in stratum s
t = index for each time, t = 1, 2, ..., T;
N_s = population size in stratum s;
$d_{r,s,t}$ = r-th customer's demand (kW) in stratum s for time t;
$c_{r,s,t}$ = r-th customer's status code (hexadecimal) in stratum s for time t;
C = worst acceptable status code (hexadecimal);
a = level of significance;
$t_{a/2}$ = Student's t-variate.

Define

$$x_{r,s,t} = \begin{cases} 1 \text{ if } \mathrm{c}_{r,s,t} \le C; \\ 0 \text{ otherwise.} \end{cases}$$

$$N = \sum_s N_s$$

$$W_s = \begin{cases} W_s^* & \text{if externally supplied;} \\ N_s / N & \text{otherwise} \end{cases}$$

STATISTIC	FORMULA
Sample size:	$n_{s,t} = \sum_r x_{r,s,t}$
Sample mean:	$\bar{d}_{s,t} = \sum_r d_{r,s,t} * x_{r,s,t} / n_{s,t}$
Sample standard deviation:	$sd_{s,t} = \sqrt{\sum_r (d_{r,s,t} * x_{r,s,t} - \bar{d}_{s,t})^2 / (n_{s,t} - 1)}$
Standard error of sample mean:	$se(\bar{d}_{s,t}) = \sqrt{(1 - n_{s,t}/N_{s,t}) * (sd^2_{s,t} / n_{s,t})}$
Class total:	$D_{s,t} = N_s * \bar{d}_{s,t}$
Standard error of class total:	$se(D_{s,t}) = N_s * se(\bar{d}_{s,t})$
Sample size:	$n_t = \sum_s n_{s,t}$
Sample mean:	$\bar{d}_t = \sum_s W_s * \bar{d}_{s,t}$
Standard deviation of demand:	$SD_{(r,s,t)} = \left[\sum_r \frac{(d_{(r,s,t)} - \bar{d}_{(r,s,t)})^2}{n_{(s,t)}} \right]^{1/2}$
Standard error of sample mean:	$se(\bar{d}_t) = \sqrt{\sum_s W_S^2 * se^2(\bar{d}_{s,t})}$
Class total:	$D_t = N * \bar{d}_t$
Standard error of class total:	$se(D_t) = N * se(\bar{d}_t)$
Degrees of freedom:	$df_t = \frac{[se^2(\bar{d}_t)]^2}{\sum_s \left[W_S^2 * \mathrm{se}^2(\bar{d}_{s,t}) \right]^2 / (n_{s,t} - 1)}$
Relative precision:	$P_t = (se(\bar{d}_t) / \bar{d}_t) * t_{a/2, df_t}$

B.3 100% Sample Analysis Equations (No Expansion)

Let:

r = index for each customer, r = 1, 2, ..., R;
t = index for each time, t = 1, 2, ..., T;
$d_{r,t}$ = = r-th customer’s demand (kW) for time t;
$c_{r,t}$ = = r-th customer’s status code (hexadecimal) for time t;

Define:

$$X_{r,t} = \begin{cases} 1 \text{ if } c_{r,t} \le 8 \text{ (i.e., data is not missing)} \\ 0 \text{ otherwise} \end{cases}$$

STATISTIC	FORMULA
Population* size:	$N_t = \sum_r X_{r,t}$
Population Total:	$D_t = \sum_r d_{r,t} * x_{r,t}$
Population mean:	$\bar{d}_t = D_t / N_t$
Population standard deviation:	$sd_t = \sqrt{\sum_r (d_{r,t} * x_{r,t} - \bar{d}_t)^2 / N_t}$

*NOTE: Only missing intervals are excluded and the assumption is that the customer dropped out of the population.

B.4 Aggregate Load Analysis Equations (Combining Only Sampled Classes)

Let:

g = index for each component group, r = 1, 2, ..., G;
t = index for each time, t = 1, 2, ..., T;
N_g = population size in component group g;
W_g = weighting factor for component group g;
a = level of significance;
$Z_{a/2}$ = normal Z-variate.

Define:

$$N = \sum_g N_g$$

$$W_g = \begin{cases} W_g^* & \text{if externally supplied} \\ N_g / N & \text{otherwise} \end{cases}$$

STATISTIC	FORMULA
Aggregate sample size:	$n_t = \sum_g n_{g,t}$
Aggregate sample mean:	$\bar{d}_t = \sum_g W_t * \bar{d}_{g,t}$
Standard error of aggregate mean:	$se(\bar{d}_t) = \sqrt{\sum_g W_g^2 * \mathrm{se}^2(\bar{d}_{g,t})}$
Aggregate total:	$D_t = N * \bar{\mathrm{d}}_t$
Standard error of aggregate total:	$se(D_t) = N * \mathrm{se}(\bar{d}_t)$
Relative precision:	$P_t = (se(\bar{d}_t) / \bar{d}_t) * Z_{a/2}$

B.5 Aggregate Load Analysis Equations (Combining Sampled and 100% Classes)

Let:

t = index for each time, $t = 1, 2, ..., T$;
N = total population of sampled groups;
D_t = total demand of sampled groups for time t;
$se(D_t)$ = standard error of total demand for time t;
g = index for each 100% sampled group;
$N_{g,t}$ = population of each 100% sampled group for time t;
$D_{g,t}$ = total demand of each 100% sampled group for time t;

$\left.\right\}$ *calculations defined* in *Section* B.4

Define:

$$F_g = \begin{cases} F_g^* & \text{if adjustment factor externally supplied;} \\ 1 & \text{otherwise} \end{cases}$$

STATISTIC	**FORMULA**
Aggregate population:	$NTOTAL_t = N + \sum_g N_{g,t}$
Aggregate total demand:	$DTOTAL_t = D_t + \sum_g F_g {}^* D_{g,t}$
Standard error of total demand	$se(DTOTAL_t) = se(D_t)$

B.6 Average Day Statistics

Average day statistics are computed from a sample across a set of customers and across a set of days. Because samples from the same customer on separate days are not completely independent, Oracle Utilities Load Analysis cannot rigorously compute standard error, degrees of freedom, or relative precision statistics. Instead Oracle Utilities Load Analysis reports a Relative Error measure using the standard error equation, where the sample size is the total number of observations across customers and days. This Relative Error cannot be interpreted as a standard error, because it would overstate the accuracy of the estimates.

Appendix C

Ratio Analysis Equations

This appendix documents the ratio analysis calculations used in Oracle Utilities Load Analysis. This material assumes a basic understanding of statistics, load research calculations, and Oracle Utilities Load Analysis's operation.

C.1 Non-Stratified Ratio Analysis Equations

Let:

r = index for each customer, r = 1, 2, ..., R;
t = index for each interval of time, t = 1, 2, ..., T;
N = total class population;
E = total billed energy for the population over the analysis period;
$d_{r,t}$ = r-th customer's demand (KW) for time interval t;
$e_{r,t}$ = r-th customer's total energy (KWH) over the analysis period;
$c_{r,t}$ = r-th customer's status code (hexadecimal) for time interval t;
C = worst acceptable status code (haxadecimal);
a = 1 - level of significance used in relative precision calculation;
$t_{a/2}$ = student's t-variate;

Define:

$$x_{r,t} = \begin{cases} 1(& \text{if } C_{r,t} <= C) \\ 0 & \text{otherwise} \end{cases}$$

$$m_{t,p} = \begin{cases} 1 & \text{if interval t is in Time-of-Use Period P} \\ 0 & \text{otherwise} \end{cases}$$

$$_{r,p} = \frac{\displaystyle\sum_{\tau?\mathrm{New}\rho\ 3E?} m_{t,p}}{\displaystyle\sum_{\tau?\mathrm{New}\rho\ 3E?} x_{r,t}} \quad (\textit{energy} \text{ proration factor for customer r for Tir } \textit{of–Use period } \text{p})$$

STATISTIC	**FORMULA**
Sample size:	$n_t = \sum_r x_{r,t}$
Sample mean demand:	$\bar{d}_t = \sum_r \frac{d_{r,t} * x_{r,t}}{n_t}$
Individual customer total energy (Used if BILL NO; otherwise value is input on Control File):	$,\ldots,e_r = \sum_p \sum_t [d_{r,t} * m_{t,p} * x_{r,t}] * (f_{r,p})$
Sample mean energy:	$\bar{e}_t = \sum_r \frac{e_{r,t} * x_{r,t}}{n_t}$
Ratio:	$R_t = \frac{\bar{d}_t}{e_t}$
Standard deviation of sample demands:	$s(d_t) = \left[\sum \frac{(d_{r,t} - \bar{d}_t)^2 * x_{r,t}}{n_t - 1} \right] 1/2$
Variance of sample demands:	$V(d_t) = [s(d_t)]^2$
Standard error of sample mean demand:	$s(\bar{d}_t) = \left[\frac{(1 - n_t/N) * V(d_t)}{n_t} \right] 1/2$
Standard deviation of sample energies:	$s(e_t) = \left[\sum_r \frac{(e_r - \bar{e}_t)^2 * x_{r,t}}{n_t - 1} \right] 1/2$

Required Conditions for the Correct Application of Ratio Estimation

Let:

$CV(\bar{d}_t)$ = Coefficient of variation for mean demand

$CV(\bar{e}_t)$ = Coefficient of variation of mean energy

n_t = Sample size for interval of time t;

Conditions:

1) $$\mathrm{CV}(\bar{d}_t) = \left[\frac{(1 - n_t/N^* V(\bar{d}_t)}{(\bar{d}_t)}\right] 1/2$$

2) $$\mathrm{CV}(\bar{e}_t) = \left[\frac{(1 - n_t/N^* V(\bar{e}_t)}{(\bar{e}_t)}\right] 1/2$$

3) $n_t \geq 30$ (for all intervals t in the analysis period)

C.2 Separate (Stratified) Ratio Analysis Equations

Let:

r = index for each customer, r = 1, 2, ..., R;
S = index for each strata within the sample, s = 1, 2, 3, ..., S;
t = index for each interval of time, t = 1, 2, 3, ..., T;
N = total class population;
N_s = strata population;
E_s = total billed energy for strata s over the analysis period;
$d_{r,s,t}$ = demand (KW) for the r-th customer in strata s for time interval t;
$e_{r,s,t}$ = total energy (KWH) for the r-th customer in strata s for time interval t;
$c_{r,s,t}$ = status code (hexadecimal) for the r-th customer in strata s for time interval t;
C = worst acceptable status code (hexadecimal);
a = 1 - level of significance used in relative precision calculation;
$t_{a/2}$ = student’s t-variate;

Define:

$$X_{r,s,t} = \begin{cases} 1 & \text{if } c_{r,t} <= C \\ 0 & \text{otherwise} \end{cases}$$

$$m_{t,p} = \begin{cases} 1 & \text{if interval t is in Time-of-Use Period p} \\ 0 & \text{otherwise} \end{cases}$$

$$= \frac{\sum_{\tau?\text{Newp 3E?}} m_{t,p}}{\sum_{\tau?\text{Newp 3E?}} x_{r,s,t}}$$

(*energy proration factor for customer* r for Tim *of–Use period* p)

$$W_s = \begin{cases} N_s / N & \text{weighting factor for strata s} \\ W_s{*} & \text{externally supplied weighting factor} \end{cases}$$

STATISTIC	FORMULA
Sample size:	$n_{s,\,t}= \sum x_{r,\,s,\,t}$
Sample mean demand:	$\bar{d}_{s,\,t}= \sum_{r} \frac{d_{r,\,s,\,t} * x_{r,\,s,\,t}}{n_{s,\,t}}$
Individual customer total energy (Used if BILL NO; otherwise value is input on Control File):	$e_{r,\,s}= \sum_{p} \sum_{t} [d_{r,\,s,\,t} * m_{t,\,p} * x_{r,\,s,\,t}] * (f_{r,\,p})$
Sample mean energy: (strata)	$\bar{e}_{s,\,t}= \sum_{r} \frac{e_{r,\,s} * x_{r,\,s,\,t}}{n_{s,\,t}}$
Standard deviation of sample demands (strata):	$s(d_{s,\,t})= \left[\sum_{r} \frac{(d_{r,\,s,\,t} - \bar{d}_{s,\,t})^2 * x_{r,\,s,\,t}}{n_{s,\,t} - 1}\right] 1/2$
Variance of sample demands (strata):	$V(d_{s,\,t})= \left[s(d_{s,\,t})\right]^2$
Standard error of sample mean demand:	$s(\bar{d}_{s,\,t})= \left[\frac{(1 - n_{s,\,t}/N_s) * V(d_{s,\,t})}{n_{s,\,t}}\right] 1/2$
Standard deviation of sample energies:	$s(e_{s,\,t})= \left[\sum_{r} \frac{(e_{r,\,s} - \bar{e}_{s,\,t})^2 * x_{r,\,s,\,t}}{n_{s,\,t} - 1}\right] 1/2$
Variance of sample energy:	$V(e_{s,\,t})= \left[s(e_{s,\,t})\right]^2$
Standard error of sample mean energy:	$s(\bar{e}_{s,\,t})= \left[\frac{(1 - n_{s,\,t}/N_s) * V(e_{s,\,t})}{n_{s,\,t}}\right] 1/2$
Separate strata ratio:	$R_{s,\,t}= \frac{\bar{d}_{s,\,t}}{\bar{e}_{s,\,t}}$
Strata mean demand:	$\bar{D}_{s,\,t}= \frac{R_{s,\,t} * E_s}{N_s}$

STATISTIC	FORMULA
Class mean (KW):	$\bar{D}_t = \sum_s \frac{R_{s,t} * E_s * W_s}{N_s}$
Covariance between energy and demand for strata:	$C_{s,t} = \sum_r \frac{(d_{r,s,t} - \bar{d}_{s,t}) * (e_{r,s} - \bar{e}_{s,t})}{n_{s,t} - 1}$
Q term of strata for standard error of class mean calculation:	$Q_{s,t} = V(d_{s,t}) + R_{s,t}^2 * V(e_{s,t}) - 2 * R_{s,t} * C_{s,t}$
Standard error of the class mean:	$s(\bar{D}_t) = \left[\sum_s \frac{W_s^2 * (1 - n_{s,t}/N_s) * (Q_{s,t})}{n_{s,t}}\right] 1/2$
Class total (KW):	$D_t = N * (\bar{D}_t)$
Standard error of class total:	$s(D_t) = N * s(\bar{D}_t)$
Standard error of separate strata ratio:	$s(R_{s,t}) = \left[\frac{(1 - n_{s,t}/N_s) * Q_{s,t}}{n_{s,t} * ((E_s/N_s)^2)}\right] 1/2$
Standard error of strata demand:	$s(D_{s,t}) = \left[\frac{N_s^2 * (1 - n_{s,t}/N_s) * Q_{s,t}}{n_{s,t}}\right] 1/2$
Relative precision:	$P_t = \frac{s(\bar{D}_t) * t_{a/2, df(t)}}{\bar{D}_t}$
Degrees of freedom:	$df_t = \frac{[s(\bar{D}_t)]^2}{\sum [W_s^2 * s(D_{\bar{s},t})^2]^2 / (n_{s,t} - 1)}$

Required Conditions for the Correct Application of Ratio Estimation

Let:

$CV(\bar{d}_t)$ = Coefficient of variation for mean demand;

$CV(\bar{e}_t)$ = Coefficient of variation for mean energy;

$n_{s,\,t}$ = Sample size for interval of time t for strata s;

S = Number of strata in separate ration analysis

Conditions:

(1) $\sqrt{S^* CV(\bar{e}_t)} = \sqrt{S^* \left[\frac{(1-n_t/N)^* V(\bar{e}_t)}{(\bar{e}_t)}\right]^{1/2}} \le 0.6$

2) $\sum_{s} n_{s,\,t} \ge 30$ (*for* all intervals t in the analysis period)

C.3 Combined (Stratified) Ratio Analysis Equations

Let:

r = index for each customer, $r = 1, 2, ..., R$;

S = index for each strata within the sample, $s = 1, 2, 3, ..., S$;

t = index for each interval of time, $t = 1, 2, 3, ..., T$;

N = total class population;

N_s = strata population

E = total billed energy for the population over the analysis period;

$d_{r,s,t}$ = demand (KW) for the r-th customer in strata s for time interval t;

$e_{r,s,t}$ = total energy (KWH) for the r-th customer in strata s for time interval t;

$c_{r,s,t}$ = status code (hexadecimal) for the r-th customer in strata s for time interval t;

C = worst acceptable status code (hexadecimal);

a = 1 - level of significance used in relative precision calculation;

$Z_{a/2}$ = Normal variate

Define:

$$x_{r,s,t} = \begin{cases} 1 & \text{if } c_{r,s,t} <= C \\ 0 & \text{otherwise} \end{cases}$$

$$m_{t,p} = \begin{cases} 1 & \text{if interval t is in Time-of-Use Period p} \\ 0 & \text{otherwise} \end{cases}$$

$$= \frac{\displaystyle\sum_{\tau?\text{Newρ 3E?}} m_{t,p}}{\displaystyle\sum_{\tau?\text{Newρ 3E?}} \overline{} x_{r,s,t}} \quad (\textit{energy proration factor for customer r for Tim of–Use} \text{ period p})$$

$$W_s = \begin{cases} N_s/N & \text{weighting factor for strata s} \\ W_s* & \text{externally supplied weighting factor} \end{cases}$$

STATISTIC	FORMULA
Sample size:	$n_{s,t} = \sum_{r} x_{r,s,t}$
Sample mean demand:	$\bar{d}_{s,t} = \sum_{r} \frac{d_{r,s,t} * x_{r,s,t}}{n_{s,t}}$
Individual customer total energy (Used if BILL NO; otherwise value is input on Control File):	$e_{r,s} = \sum_{p} \sum_{t} [d_{r,s,t} * m_{t,p} * x_{r,s,t}] * (f_{r,p})$
Sample mean energy: (strata)	$\bar{e}_{s,t} = \sum_{r} \frac{e_{r,s} * \mathrm{x}_{r,s,t}}{n_{s,t}}$
Standard deviation of sample demands (strata):	$s(d_{s,t}) = \left[\sum_{r} \frac{(d_{r,s,t} - \bar{d}_{s,t})^2 * x_{r,s,t}}{n_{s,t} - 1} \right]^{1/2}$
Variance of sample demands (strata):	$V(d_{s,t}) = \left[s(d_{s,t}) \right]^2$
Standard error of sample mean demand:	$s(\bar{d}_{s,t}) = \left[\frac{(1 - n_{s,t}/N_s) * V(d_{s,t})}{n_{s,t}} \right]^{1/2}$
Standard deviation of sample energies:	$s(e_{s,t}) = \left[\sum_{r} \frac{(e_{r,s} - \bar{e}_{s,t})^2 * x_{r,s,t}}{n_{s,t} - 1} \right]^{1/2}$
Variance of sample energy:	$V(e_{s,t}) = \left[s(e_{s,t}) \right]^2$
Standard error of sample mean energy:	$s(\bar{e}_{s,t}) = \left[\frac{(1 - n_{s,t}/N_s) * V(e_{s,t})}{n_{s,t}} \right]^{1/2}$
Standard deviation of sample residual demand	$SD_{s,t} = \left[\sum_{r} \frac{[(d_{r,s,t} - R_t * e_{r,s})^{2*} x_{r,s,t}]}{n_{s,t} - 1} \right]^{1/2}$
Combined strata ratio:	$R_t = \frac{\sum_{s} W_s * \bar{d}_{s,t}}{\sum_{s} W_s * \bar{e}_{s,t}} = \frac{\bar{d}_t}{\bar{e}_t}$
Class mean (KW)	$\bar{D}_t = \frac{R_t * E}{N}$
Covariance between energy and demand for strata:	$C_{s,t} = \sum_{r} \frac{(d_{r,s,t} - \bar{d}_t) * (e_{r,s} - \bar{e}_{s,t})}{n_{s,t} - 1}$
Q term of strata for standard error of class mean calculation:	$Q_{s,t} = V(d_{s,t}) + R_t^2 * V(e_{s,t}) - 2 * R_t * C_{s,t}$

STATISTIC	**FORMULA**
Standard error of the class mean:	$s(\bar{D}_t)= \left[\sum_s \frac{W_s^2 \; * \; (1-n_{s,t}/N_s)*(Q_{s,t})}{n_{s,t}}\right]^{1/2}$
Class total (KW):	$D_t = N*(\bar{D}_t)$
Standard error of class total:	$s(D_t) = N*s(\bar{D}_t)$
Standard error of combined ratio:	$sR_t = \left[\sum_s \frac{(1-n_{s,t}/N_s)*Q_{s,t}}{n_{s,t}*(\bar{e}_{s,t})^2}\right]^{1/2}$
Relative precision:	$P_t = \frac{s(\bar{D}_t) \; * \; Z_{a/2,\, df(t)}}{\bar{D}_t}$

Required Conditions for the Correct Application of Ratio Estimation

Let:

$CV(\bar{d}_t)=$ Coefficient of variation for mean demand;

$CV(\bar{e}_t)=$ Coefficient of variation for energy demand;

$n_{s,t}=$ Sample size for interval of time t for strata s;

Conditions:

(1) $\mathrm{CV}\bar{e}_t = \left[\frac{(1-n_t/N)*V(\bar{e}_t)}{(\bar{e}_t)}\right]^{1/2} \le 0.2$

(2) $\sum_s n_{s,t} \ge 30$ (*for* all intervals t in the analysis period)

Average Day Statistics

Average day statistics are computed from a sample across a set of customers and across a set of days. Since samples from the same customer on separate days are not completely independent, Oracle Utilities Load Analysis cannot rigorously compute standard error, degrees of freedom, or relative precision statistics. Instead Oracle Utilities Load Analysis reports a Relative Error measure using the standard error equation, where the sample size is the total number of observations across customers and days. This Relative Error cannot be interpreted as a standard error, because it would overstate the accuracy of the estimates.

Appendix D

Reading "Analysis Statistics Written to the ELDB" Reports and Listings of Analysis Statistic Names

This appendix begins with a detailed description of the "Statistics Written to the ELDB" report. This report is a very useful summary of the statistics produced and saved during an analysis run.

The remainder of the appendix documents the names assigned to analysis statistics produced by Oracle Utilities Analysis programs. It includes the entire set of names for non-stratified and stratified standard load analysis statistics, non-stratified, combined, and separate ratio statistics, 100% sample statistics, and aggregate analysis statistics. The order of the statistic listings is:

1. Non-Stratified and Stratified Standard Load Analysis (these use the same naming conventions)
2. Non-Stratified Ratio Analysis
3. Stratified Ratio Analysis (Combined and Separate)
4. 100% Sample Analysis
5. Aggregate Analysis: Sample Only Mode
6. Aggregate Analysis: 100% Mode.

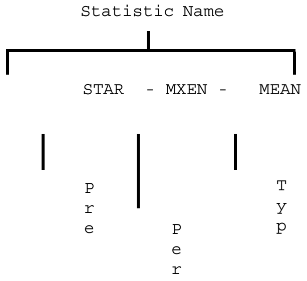
All of these statistics are produced by the associated analysis run and written back to the ELDB for future analysis.

How to Read the “Analysis Statistics Written to the ELDB” Reports

One of the reports produced at the end of a successful analysis run is a list of all statistics that the program wrote to the ELDB. This title of this report is “Analysis Statistics Written to the ELDB,” and contains the following information:

- **Simulated ID —** the names, or “keys”, that Oracle Utilities Load Analysis has assigned to the statistics produced by the analysis run. *These identifiers do not appear in the other analysis reports, but* ***you need to know them if you want to retrieve the statistics*** *and/or apply other reporting programs to them.*

  For your information, each statistic name is made up of three parts:



- **Prefix** identifies a group of statistics produced by an analysis run. *The user assigns this prefix* before the analysis using the Key Command in the Analysis Environment File.
- **Period** identifies (in most cases) the time period represented by the statistic — such as “average weekday” or “average Friday.” *This field is automatically filled in by the Oracle Utilities Load Analysis program* using a 2- to 5-character code. For your convenience, these codes are summarized on the following page in Table D-1, *“Analysis Statistics Names, Report Qualifiers,”* and in the *Oracle Utilities Load Analysis Quick Reference Guide* under the same heading.
- **Type** identifies (in most cases) the methodology used to compute the statistic and the type of statistic, e.g., “Combined Relative Precision” or “Standard Error Combined Ratio Mean KW.” *This field is automatically filled in by the Oracle Utilities Load Analysis program* using a 4-character code. For your convenience, these codes are summarized in Table D-2, “Statistic Qualifiers,” and in the *Oracle Utilities Load Analysis Quick Reference Guide* under the same heading.
- **Channel** — actually refers to a stratum number. It identifies the stratum for which the statistics was computed. The value is automatically assigned by Oracle Utilities Load Analysis (based on the user’s input in the analysis Control File). Strata are assigned digits 1 through 9 if no more than nine strata are in the class. If there are more than nine strata, the program automatically adds two digits to the statistic prefix (for example, STAR-01 for stratum 1), and leaves a “0” in the stratum number field.

  If there are no strata (such as for sample statistics), Oracle Utilities Load Analysis puts a “0” in the stratum field.
- **Start time** — indicates the start-time of the analysis period, expressed in the format mm/dd/yy-hh:mm. It is important to note that, for all statistics, this date and time represent the beginning of the entire period examined in the analysis, not the particular date or date range represented by a specific statistic. For example, if a statistic were computed for the day of class peak during May, the start-time in the report would be 05/01/98-00:59:59, even if the class peak occurred on May 24th.
- **Statistic** — description of the statistic.
- **Status —** indicates whether the cut was entered in the ELDB, or replaced in the ELDB.

Table D-1: Analysis Statistics Names, Report Qualifiers

CODE	DESCRIPTORS
AD	Average Day Demands (KW)
ADX	Average Day Demands Excluding Holidays (KW)
CD	Maximum Coincident Demands (KW)
CF	Confidence Factors
DEM	Average Demand Period
DF	Diversity Factors
DUR	Load Duration
ENTR	Entire Period Demands (KW)
FRI	Average Friday Demands (KW)
HWN	Average Holiday or Weekend Demands (KW)
LFC	Load Factors Based on Maximum Coincident Demands
LFN	Load Factors Based on Non-Coincident Demands
MCD	Minimum Coincident Demand (KW)
MON	Average Monday Demands (KW)
MNEN	Day of Class Minimum Demands (KW)
MNT01	Day of Class Minimum TOU Period1 Demands (KW)
MNT02	Day of Class Minimum TOU Period2 Demands (KW)
MXEN	Day of Class Peak Demands (KW)
MXP01	Day of Supplied Peak 01 Demands (KW)
MXT01	Day of Class Peak TOU Period 01 Demands (KW)
MXT02	Day of Class Peak TOU Period 02 Demands (KW)
NCD	Non-Coincident Demands (KW)
NGY	Energy (KWH (Prorated))
SAT	Average Saturday Demands (KW)
SDR	Standard Deviation of Sample Residuals of Demand (KW)
SMPL	Standard Deviation of Sample Demand (KW)
SUN	Average Sunday Demands (KW)
THU	Average Thursday Demands (KW)
TUE	Average Tuesday Demands (KW)
USD	User Supplied Days
WD	Average Weekday Demands (KW)

Table D-1: Analysis Statistics Names, Report Qualifiers

CODE	DESCRIPTORS
WDH	Average Weekday Holiday Demands (KW)
WDX	Average Weekday Demands Excluding Holidays (KW)
WED	Average Wednesday Demands (KW)
WEH	Average Weekend and Holidays
WN	Average Weekend Demands (KW)
WNH	Average Weekend Holiday Demands (KW)
WNX	Average Weekend Demands Excluding Holidays (KW)

Table D-2: Statistic Qualifiers

CODE	DESCRIPTORS
AVRG	Sample Mean
CMEN	Combined Ratio Mean KW
CPRE	Combined Relative Precision
CSDR	Combined Standard Deviation of Residuals
FREE	Degrees of Freedom
MEAN	Sample Mean
POPL	Population
PREC	Relative Precision
RMEN	Ratio Mean KW
RPRE	Relative Precision
RSIZ	Sample Size
SCOR	Expansion Correlation (KW, KWH)
SECM	Standard Error Combined Ratio Mean (KW)
SERM	Standard Error Ratio Mean KW
SESM	Standard Error of Sample Mean
SESP	Standard Error Separate Ratio Mean
SETL	Standard Error of Sample Total
SIZE	Sample Size
SMEN	Separate Ratio Mean KW
SPRE	Separate Relative Precision
SSDR	Separate Standard Deviation of Residuals
SSIZ	Sample Size

Table D-2: Statistic Qualifiers

CODE	DESCRIPTORS
SSTU	10% T-Statistic
STDV	Standard Deviation of Sample Demand
TOTL	Total Demand

Appendix E

Individual Customer Statistics File Formats

This appendix describes the formats and content of the Individual Customer Statistics (ICS) files that are produced by the following Oracle Utilities Analysis programs.

- Standard Load Analysis (Y310)
- Ratio Analysis (Y330)
- Domains MPU (Y350)
- Domains Ratio (Y360)
- 100% Sample Analysis (Y380).

The Individual Customer Statistics File is produced at the conclusion of a successful run of the Standard Load, Ratio, Domains MPU, Domains Ratio, and 100% Sampled Analysis programs. This file contains basic load statistics for each customer included in the analysis (one record per customer).

Numeric variables in this file are in either *character* or *binary* format, depending upon which you specified in the Environment File's ICS Command. The character format is human-readable; the binary format is designed for use with other computer programs.

The content of the ICS file varies slightly from program to program. On the following pages, you will find tables that describe the binary and character formats produced by each analysis program.

Here are some additional notes about the files produced by each program:

Standard Load Analysis (Y310)

Statistics are written for the entire period, each of 9 time-of-use periods, the strata peak, and 25 supplied peaks. If a preliminary analysis is performed, the time-of-use period and strata peak coincident demands are set to missing. Missing values are indicated by -9999. The file is a fixed length file of 1800 bytes.

Ratio Analysis (Y330)

Statistics are written for the entire period, each of 9 time-of-use periods, the strata peak, 23 supplied peaks, and customer billed energy. If a preliminary analysis is performed, the time-of-use period coincident demands are set to missing. Missing values are indicated by -9999. The file is a fixed length file of 1800 bytes.

Domains MPU (Y350)

Each record in the file corresponds to a single customer. Statistics are written for the entire period, each of 9 time-of-use periods, the strata peak, and 25 supplied peaks. If a preliminary analysis is performed, the time-of-use period coincident demands are set to missing. Missing values are indicated by -9999. The file is a fixed length file of 1800 bytes.

Domains Ratio (Y360)

Each record in the file corresponds to a single customer. Statistics are written for the entire period, each of 9 time-of-use periods, the strata peak, and 25 supplied peaks. If a preliminary analysis is performed, the time-of-use period coincident demands are set to missing. Missing values are indicated by -9999. The file is a fixed length file of 1800 bytes.

100% Sample Analysis (Y380)

Each record in the file corresponds to a single customer. Statistics are written for the entire period, each of nine time-of-use periods, and 25 supplied peaks. If a preliminary analysis is performed, time-of-use period coincident demands are set to missing. Missing values are indicated by -9999. The file is a fixed length file of 1800 bytes.

Table 1: Individual Customer Statistics File Character Format — Standard Load Analysis (Y310)

ELEMENT	PERIOD	DESCRIPTION
1	—	Customer ID
2	—	Strata
3	Entire	Expected Observations
4	Entire	Valid Observations
5	Entire	Energy
6	Entire	Non-Coincident Demand
7	Entire	Coincident Demand
8	Entire	Coincident Load Factor
9	Entire	Non-Coincident Load Factor
10	Time-of-Use 1	Expected Observations
11	Time-of-Use 1	Valid Observations
12	Time-of-Use 1	Energy
13	Time-of-Use 1	Non-Coincident Demand
14	Time-of-Use 1	Coincident Demand
15	Time-of-Use 1	Coincident Load Factor
16	Time-of-Use 1	Non-Coincident Load Factor
•	•	•
•	•	•
•	•	•
66	Time-of-Use 9	Expected Observations
67	Time-of-Use 9	Valid Observations
68	Time-of-Use 9	Energy
69	Time-of-Use 9	Non-Coincident Demand
70	Time-of-Use 9	Coincident Demand
71	Time-of-Use 9	Coincident Load Factor
72	Time-of-Use 9	Non-Coincident Load Factor
73	—	Strata Peak Demand
74	—	Strata Peak Load Factor
75	—	Supplied Peak 1 Demand
76	—	Supplied Peak 1 Load Factor
77	—	Supplied Peak 2 Demand
78	—	Supplied Peak 2 Load Factor
•	•	•
•	•	•
•	•	•
123	—	Supplied Peak 25 Demand
124	—	Supplied Peak 25 Load Factor
125	—	Analysis Key
126	—	Channel
127	—	Analysis Start Date (MMDDYYHHMMSS)
128	—	Analysis Stop Date (MMDDYYHHMMSS)
129	Entire	Coincident Demand Time
130	Entire	Non-Coincident Demand Time
131	Time-of-Use 1	Coincident Demand Time
132	Time-of-Use 1	Non-Coincident Demand Time
•	•	•
•	•	•
•	•	•
147	Time-of-Use 9	Coincident Demand Time
148	Time-of-Use 9	Non-Coincident Demand Time
149	—	Strata Peak Time
150	—	Supplied Peak 1 Time
•	•	•
•	•	•
•	•	•
174	—	Supplied Peak 25 Time
175	—	Descriptor
176	—	Channel Combination
177	—	Filler

This file is produced in a comma-separated format.

Table 2: Individual Customer Statistics File, Character Format — Ratio Analysis (Y330)

ELEMENT	PERIOD	DESCRIPTION
1	—	Customer ID
2	—	Strata
3	Entire	Expected Observations
4	Entire	Valid Observations
5	Entire	Energy
6	Entire	Non-Coincident Demand
7	Entire	Coincident Demand
8	Entire	Coincident Load Factor
9	Entire	Non-Coincident Load Factor
10	Time-of-Use 1	Expected Observations
11	Time-of-Use 1	Valid Observations
12	Time-of-Use 1	Energy
13	Time-of-Use 1	Non-Coincident Demand
14	Time-of-Use 1	Coincident Demand
15	Time-of-Use 1	Coincident Load Factor
16	Time-of-Use 1	Non-Coincident Load Factor
•	•	•
•	•	•
•	•	•
66	Time-of-Use 9	Expected Observations
67	Time-of-Use 9	Valid Observations
68	Time-of-Use 9	Energy
69	Time-of-Use 9	Non-Coincident Demand
70	Time-of-Use 9	Coincident Demand
71	Time-of-Use 9	Coincident Load Factor
72	Time-of-Use 9	Non-Coincident Load Factor
73	—	Strata Peak Demand
74	—	Strata Peak Load Factor
75	—	Supplied Peak 1 Demand
76	—	Supplied Peak 1 Load Factor
77	—	Supplied Peak 2 Demand
78	—	Supplied Peak 2 Load Factor
•	•	•
•	•	•
•	•	•
121	—	Supplied Peak 24 Demand
122	—	Supplied Peak 24 Load Factor
123	—	Customer Billed Energy
124	—	Analysis Key
125	—	Channel
126	—	Analysis Start Date (MMDDYYHHMMSS)
127	—	Analysis Stop Date (MMDDYYHHMMSS)
128	Entire	Coincident Demand Time
129	Entire	Non-Coincident Demand Time
130	Time-of-Use 1	Coincident Demand Time
131	Time-of-Use 1	Non-Coincident Demand Time
•	•	•
•	•	•
•	•	•
145	Time-of-Use 9	Coincident Demand Time
146	Time-of-Use 9	Non-Coincident Demand Time
147	—	Strata Peak Time
148	—	Supplied Peak 1 Time
•	•	•
•	•	•
•	•	•
172	—	Supplied Peak 24 Time
173	—	Descriptor
174	—	Channel Combination

This file is produced in a comma-separated format.

Table 3: Individual Customer Statistics File Character Format — Domains MPU (Y350)

ELEMENT	PERIOD	DESCRIPTION
1	—	Customer ID
2	—	Strata
3	Entire	Expected Observations
4	Entire	Valid Observations
5	Entire	Energy
6	Entire	Non-Coincident Demand
7	Entire	Coincident Demand
8	Time-of-Use 1	Expected Observations
9	Time-of-Use 1	Valid Observations
10	Time-of-Use 1	Energy
11	Time-of-Use 1	Non-Coincident Demand
12	Time-of-Use 1	Coincident Demand
•	•	•
•	•	•
•	•	•
48	Time-of-Use 9	Expected Observations
49	Time-of-Use 9	Valid Observations
50	Time-of-Use 9	Energy
51	Time-of-Use 9	Non-Coincident Demand
52	Time-of-Use 9	Coincident Demand
53	—	Strata Peak Demand
54	—	Supplied Peak 1 Demand
55	—	Supplied Peak 2 Demand
•	•	•
•	•	•
•	•	•
78	—	Supplied Peak 25 Demand
79	—	Analysis Key
80	—	Channel
81	—	Analysis Start Date (MMDDYYHHMMSS)
82	—	Analysis Stop Date (MMDDYYHHMMSS)
83	Entire	Coincident Demand Time
84	Entire	Non-Coincident Demand Time
85	Time-of-Use 1	Coincident Demand Time
86	Time-of-Use 1	Non-Coincident Demand Time
•	•	•
•	•	•
•	•	•
101	Time-of-Use 9	Coincident Demand Time
102	Time-of-Use 9	Non-Coincident Demand Time
103	—	Strata Peak Time
104	—	Supplied Peak 1 Time
•	•	•
•	•	•
•	•	•
128	—	Supplied Peak 25 Time
129	—	Descriptor
130	—	Channel Combination
131	—	Filler

This file is produced in a comma-separated format.

Table 4: Individual Customer Statistics File Character Format — Domains Ratio (Y360)

ELEMENT	PERIOD	DESCRIPTION
1	—	Customer ID
2	—	Strata
3	Entire	Expected Observations
4	Entire	Valid Observations
5	Entire	Energy
6	Entire	Non-Coincident Demand
7	Entire	Coincident Demand
8	Entire	Coincident Load Factor
9	Entire	Non-Coincident Load Factor
10	Time-of-Use 1	Expected Observations
11	Time-of-Use 1	Valid Observations
12	Time-of-Use 1	Energy
13	Time-of-Use 1	Non-Coincident Demand
14	Time-of-Use 1	Coincident Demand
15	Time-of-Use 1	Coincident Load Factor
16	Time-of-Use 1	Non-Coincident Load Factor
•	•	•
•	•	•
•	•	•
66	Time-of-Use 9	Expected Observations
67	Time-of-Use 9	Valid Observations
68	Time-of-Use 9	Energy
69	Time-of-Use 9	Non-Coincident Demand
70	Time-of-Use 9	Coincident Demand
71	Time-of-Use 9	Coincident Load Factor
72	Time-of-Use 9	Non-Coincident Load Factor
73	—	Strata Peak Demand
74	—	Strata Peak Load Factor
75	—	Supplied Peak 1 Demand
76	—	Supplied Peak 1 Load Factor
77	—	Supplied Peak 2 Demand
78	—	Supplied Peak 2 Load Factor
•	•	•
•	•	•
•	•	•
123	—	Supplied Peak 25 Demand
124	—	Supplied Peak 25 Load Factor
125	—	Analysis Key
126	—	Channel
127	—	Analysis Start Date (MMDDYYHHMMSS)
128	—	Analysis Stop Date (MMDDYYHHMMSS)
129	Entire	Coincident Demand Time
130	Entire	Non-Coincident Demand Time
131	Time-of-Use 1	Coincident Demand Time
132	Time-of-Use 1	Non-Coincident Demand Time
•	•	•
•	•	•
•	•	•
147	Time-of-Use 9	Coincident Demand Time
148	Time-of-Use 9	Non-Coincident Demand Time
149	—	Strata Peak Time
150	—	Supplied Peak 1 Time
•	•	•
•	•	•
•	•	•
174	—	Supplied Peak 25 Time
175	—	Descriptor
176	—	Channel Combination
177	—	Filler

This file is produced in a comma-separated format.

Table 5: Individual Customer Statistics File Character Format — 100% Sample Analysis (Y380)

ELEMENT	PERIOD	DESCRIPTION
1	—	Customer ID
2	—	Strata
3	Entire	Expected Observations
4	Entire	Valid Observations
5	Entire	Energy
6	Entire	Non-Coincident Demand
7	Entire	Coincident Demand
8	Entire	Coincident Load Factor
9	Entire	Non-Coincident Load Factor
10	Time-of-Use 1	Expected Observations
11	Time-of-Use 1	Valid Observations
12	Time-of-Use 1	Energy
13	Time-of-Use 1	Non-Coincident Demand
14	Time-of-Use 1	Coincident Demand
15	Time-of-Use 1	Coincident Load Factor
16	Time-of-Use 1	Non-Coincident Load Factor
•	•	•
•	•	•
•	•	•
66	Time-of-Use 9	Expected Observations
67	Time-of-Use 9	Valid Observations
68	Time-of-Use 9	Energy
69	Time-of-Use 9	Non-Coincident Demand
70	Time-of-Use 9	Coincident Demand
71	Time-of-Use 9	Coincident Load Factor
72	Time-of-Use 9	Non-Coincident Load Factor
73	—	Strata Peak Demand
74	—	Strata Peak Load Factor
75	—	Supplied Peak 1 Demand
76	—	Supplied Peak 1 Load Factor
77	—	Supplied Peak 2 Demand
78	—	Supplied Peak 2 Load Factor
•	•	•
•	•	•
•	•	•
123	—	Supplied Peak 25 Demand
124	—	Supplied Peak 25 Load Factor
125	—	Analysis Key
126	—	Channel
127	—	Analysis Start Date (MMDDYYHHMMSS)
128	—	Analysis Stop Date (MMDDYYHHMMSS)
129	Entire	Coincident Demand Time
130	Entire	Non-Coincident Demand Time
131	Time-of-Use 1	Coincident Demand Time
132	Time-of-Use 1	Non-Coincident Demand Time
•	•	•
•	•	•
•	•	•
147	Time-of-Use 9	Coincident Demand Time
148	Time-of-Use 9	Non-Coincident Demand Time
149	—	Strata Peak Time
150	—	Supplied Peak 1 Time
•	•	•
•	•	•
•	•	•
174	—	Supplied Peak 25 Time
175	—	Descriptor
176	—	Channel Combination
177	—	Filler

This file is produced in a comma-separated format.

Appendix F

Coincident Peak Analysis Equations

This appendix documents the coincident peak analysis calculations used in the Coincident Peak Analysis Program. This material assumes a basic understanding of statistics, load research calculations, and Oracle Utilities Load Analysis's operation.

F.1 Non-Stratified Coincident Peak Analysis Equations (Mean-Per-Unit)

Let:

i = customer index, $i = 1, 2, ..., I$;
j = period index, $j = 1, 2, ..., J$ ($J \leq 12$);
b_j = j-th period's weight;
N_j = total population for period j;
y_{ji} = i-th customer's demand (KW) for period j;
C_{ji} = i-th customer's status code (hexadecimal) for period j;
C = worst acceptable status code;

Define:

$$X_{ji} = \begin{cases} 1 \text{ if } C_{ji} \leq C; \\ 0 \text{ otherwise.} \end{cases}$$

Average Customer Level

STATISTIC	**FORMULA**
Sample size:	(F1.1a) $n_j = \sum_{i=j}^{l} X_{ji}$
Average (between period) sample size:	(F1.2a) $\bar{n}_{jk} = (n_j + n_k)/2$
Common (between period) sample size:	(F1.3a) $n'_{jk} = \sum_{i=1}^{I} X_{ji} * X_{ki}$
Estimated mean demand (Sample mean demand):	(F1.4a) $\hat{y}_j \equiv \bar{y}_j = \sum_{i=1}^{I} (y_{ji} * X_{ji})/n_j$
Row demand (Common mean demand):	(F1.5a) ${}_r\hat{y}_{jk} \equiv {}_r\bar{y}_{jk} = \sum_{i=1}^{I} (y_{ji} * X_{ji} * X_{ki})/n'_{jk}$
Column demand (Common mean demand):	(F1.6a) ${}_c\hat{y}_{jk} \equiv {}_c\bar{y}_{jk} = \sum_{i=1}^{I} (y_{ki} * X_{ki} * X_{ji})/n'_{jk}$
Variance of sample demands:	(F1.7a) $V(y_j) = \sum_{i=1}^{I} [(y_{ji} - \bar{\bar{y}}_j)^{2*} X_{ji}]/(n_j - 1)$
Variance of estimated mean demand:	(F1.8a) $V(\bar{y}_j) = (1 - n_j/N_j) * V(y_j)/n_j$
Standard error of estimated mean demand:	(F1.9a) $SE(\bar{y}_j) = [V(y_j)]^{1/2}$
Common variance of sample demands (row j):	(F1.10a) $V'({}_r y_{jk}) = \sum_{i=1}^{I} [(y_{ji} - {}_r\bar{y}_{jk})^2 * X_{ji} * X_{ki}]/(n'_{jk} - 1)$
Standard error of sample demands (row j):	(F1.11a) $SE({}_r y_{jk}) = [V'({}_r y_{jk})]^{1/2}$
Common variance of sample demands (column k):	(F1.12a) $V'({}_c y_{jk}) = \sum_{i=1}^{I} [(y_{ki} - {}_c\bar{y}_{jk})^2 * X_{ki} * X_{ji}]/(n'_{jk} - 1)$
Standard error of sample demands (column k):	(F1.13a) $SE({}_c y_{jk}) = [V'({}_c y_{jk})]^{1/2}$
Covariance of (between period) sample demands:	(F1.14a) $COV(y_j, y_k) = \sum_{i=1}^{I} [(y_{ji} - {}_r\bar{y}_{jk})$ $* (y_{ki} - {}_c\bar{y}_{jk}) * X_{ji} * X_{ki}]/(n'_{jk} - 1)$
Correlation coefficient:	(F1.15a) $CORR(y_{jk}) = \frac{COV(y_j, y_k)}{[SE({}_r y_{jk}) * SE({}_c y_{jk})]}$
Coincident peak demand (period):	(F1.16a) $\tau_j = \bar{y}_j$

STATISTIC	FORMULA
Variance of coincident peak demand (total):	(F1.17a) $V(\tau_j) = V(\bar{y}_j)$
Standard error of coincident peak demand (total):	(F1.18a) $SE(\hat{\tau}_j) = [V(\hat{\tau}_j)]^{1/2}$
Variability of coincident peak demand (period):	(F1.19a) $VAR(\hat{\tau}_j) = V(\hat{\tau}_j) * b_j + \sum_{k \neq j} [1 - (n_j + n_k)/(N_j + N_k)] * b_k * (1/\bar{n}_{jk}) * COV(y_j, y_k)$
Standard error of variability of coincident peak demand (period):	(F1.20a) $SE(\hat{\tau}_j) = [VAR(\hat{\tau}_j)]^{1/2}$
Mean coincident peak demand:	(F1.21a) $\hat{\bar{\tau}} = \sum_{j=1}^{J} \hat{\tau}_j * b_j$
Variance of mean coincident peak demand (entire period):	(F1.22a) $V(\hat{\bar{\tau}}) = \sum_{j=1}^{J} V(\hat{\tau}_j) * b_j^2 + 2 * \sum_{j<k}\sum b_j * b_k * [1 - (n_j + n_k)/(N_j + N_k)] * COV(y_j, y_k) * (1/\bar{n}_{jk})$
Standard error of mean coincident peak demand (entire period):	(F1.23a) $SE(\hat{\bar{\tau}}) = [V(\hat{\bar{\tau}})]^{1/2}$

Customer Class Level

STATISTIC	FORMULA
Sample size:	(F1.1c) $n_j = \sum_{i=j}^{I} X_{ji}$
Average (between period) sample size:	(F1.2c) $\bar{n}_{jk} = (n_j + n_k)/2$
Common (between period) sample size:	(F1.3c) $n'_{jk} = \sum_{i=1}^{I} X_{ji} * X_{ki}$
Estimated mean demand (Sample mean demand):	(F1.4c) $\hat{y}_j \equiv \bar{y}_j = \sum_{i=1}^{I} (y_{ji} * x_{ji})/n_j$
Row demand (Common mean demand):	(F1.5c) ${}_r\hat{y}_{jk} \equiv {}_r\bar{y}_{jk} = \sum_{i=1}^{I} (y_{ji} * x_{ji} * x_{ki})/n'_{jk}$
Column demand (Common mean demand):	(F1.6c) ${}_c\hat{y}_{jk} \equiv {}_c\bar{y}_{jk} = \sum_{i=1}^{I} (y_{ki} * x_{ki} * x_{ji})/n'_{jk}$
Variance of sample demands:	(F1.7c) $V(y_j) = \sum [(y_{ji} - \bar{y}_j)^2 * x_{ji}]/(n_j - 1)$

STATISTIC	FORMULA
Variance of estimated mean demand:	(F1.8c) $V(\bar{y}_j) = (1 - n_j / N_j) * V(y_j) / n_j$
Standard error of estimated mean demand:	(F1.9c) $SE(\bar{y}_j) = [V(\bar{y}_j)]^{1/2}$
Common variance of sample demands (row j):	(F1.10c) $V'({}_r y_{jk}) = \sum_{i=1}^{I} [(y_{ji} - {}_r\bar{y}_{jk})^2 * X_{ji} * X_{ki}] / (n'_{jk} - 1)$
Standard error of sample demands (row j):	(F1.11c) $SE({}_r y_{jk}) = [V'({}_r y_{jk})]^{1/2}$
Common variance of sample demands (column k):	(F1.12c) $V'({}_c y_{jk}) = \sum_{i=1}^{I} [(y_{ki} - {}_c\bar{y}_{jk})^2 * x_{ki} * x_{ji}] / (n'_{jk} - 1)$
Standard error of sample demands (column k):	(F1.13c) $SE({}_c y_{jk}) = [V'({}_c y_{jk})]^{1/2}$
Covariance of (between period) sample demands:	(F1.14c) $COV(y_j, y_k) = \sum_{i=1}^{I} [(y_{ji} - {}_r\bar{y}_{jk})$ $* (y_{ki} - {}_c\bar{y}_{jk}) * X_{ji} * X_{ki}] / (n'_{jk} - 1)$
Correlation coefficient:	(F1.15c) $CORR(y_{jk}) = \frac{COV(y_j, y_k)}{[SE({}_r y_{jk}) * SE({}_c y_{jk})]}$
Coincident peak demand (period):	(F1.16c) $\hat{\tau}_j = N_j * \bar{y}_j$
Variance of coincident peak demand (total):	(F1.17c) $V(\hat{\tau}_j) = N_j^2 * V(\bar{y}_j)$
Standard error of coincident peak demand (total):	(F1.18c) $SE(\hat{\tau}_j) = [V(\hat{\tau}_j)]^{1/2}$
Variability of coincident peak demand (period):	(F1.19c) $VAR(\hat{\tau}_j) = V(\hat{\tau}_j) * b_j + \sum_{k \neq j} [1 - (n_j + n_k) / (N_j + N_k)]$ $* b_k * (1 / \bar{n}_{jk}) N_j * \mathrm{N}_k * COV(y_j, y_k)$
Standard error of variability of coincident peak demand (period):	(F1.20c) $SE(\hat{\tau}_j) = [VAR(\hat{\tau}_j)]^{1/2}$
Mean coincident peak demand:	(F1.21c) $\hat{\bar{\tau}} = \sum_{j=1}^{J} \hat{\tau}_j * b_j$
Variance of mean coincident peak demand (entire period):	(F1.22c) $V(\hat{\bar{\tau}}) = \sum_{j=1}^{J} V(\hat{\tau}_j) * b_j^2 + 2 * \sum\sum_{j<k} b_j * b_k *$ $[1 - (n_j + n_k) / (N_j + N_k)] * COV(y_j, y_k) * (1 / \bar{n}_{jk}) * N_j * N_k$
Standard error of mean coincident peak demand (entire period):	(F1.23c) $SE(\hat{\bar{\tau}}) = [V(\hat{\bar{\tau}})]^{1/2}$

F.2 Non-Stratified Coincident Peak Analysis Equations (Ratio)

Let:

i = customer index, $i = 1, 2, ..., I$;
j = period index, $j = 1, 2, ..., J$ ($J \leq 12$);
b_j = j-th period's weight;
N_j = total population for period j;
y_{ji} = i-th customer's demand (KW) for period j;
e_{ji} = i-th customer's billed energy (KWH), period j;
Ej = total billed energy for the customer class in period j;
C_{ji} = i-th customer's status code (hexadecimal) for period j;
C = worst acceptable status code;

Define:

$$X_{ji} = \begin{cases} 1 \text{ if } C_{ji} \leq C; \\ 0 \text{ otherwise.} \end{cases}$$

$$\bar{E}_j = E_j / N_j$$

Average Customer Level

STATISTIC	FORMULA
Sample size:	(F2.1a) $n_j = \sum_{i=j}^{I} X_{ji}$
Average (between period) sample size:	(F2.2a) $\bar{n}_{jk} = (n_j + n_k)/2$
Common (between period) sample size:	(F2.3a) $n'_{jk} = \sum_{i=1}^{I} X_{ji} * X_{ki}$
Estimated mean demand (Sample mean demand):	(F2.4a) $\bar{y}_j = \sum_{i=1}^{I} (y_{ji} * x_{ji}) / n_j$
Estimated mean energy (Sample mean energy)	(F2.5a) $\bar{e}_j = \sum_{i=1}^{I} (e_{ji} * x_{ji}) / n_j$
Ratio of mean demand to mean energy:	(F2.6a) $\hat{R}_j = \bar{y}_j / \bar{e}_j$
Estimated mean demand (ratio):	(F2.7a) $\hat{y}_j = \sum_{i=1}^{I} \hat{R}_j * (e_{ji} * x_{ji}) / n_j$
Mean row demand (ratio):	(F2.8a) ${}_r\hat{y}_{jk} = \sum_{i=1}^{I} (\hat{R}_j * e_{ji} * x_{ji} * x_{ki}) / n'_{jk}$

STATISTIC	**FORMULA**
Mean column demand (ratio):	(F2.9a) $\,_c\hat{y}_{jk} = \sum_{i=1}^{I} (\hat{R}_k{}^* e_{ki}{}^* x_{ki}{}^* x_{ji}) / n'_{jk}$
Variances of sample demands:	(F2.10a) $V(y_j) = \sum_{i=1}^{I} [(y_{ji} - \bar{y}_j)^2 * x_{ji}] / (n_j - 1)$
Variance of sample energies:	(F2.11a) $V(e_j) = \sum_{i=1}^{I} [(e_{ji} - \bar{e}_j)^{2*} x_{ji}] / (n_j - 1)$
Variance of estimated mean demand (ratio):	(F2.12a) $V(\hat{y}_j) = (1 - n_j / N_j) * (1 / n_j) * \sum_{i=1}^{I} [(y_{ji} - \hat{R}_j{}^* e_{ji})^2$ $* x_{ji}] / (n_j - 1\ )$
Standard error of estimated mean demand:	(F2.13a) $SE(\hat{y}_j) = [V(\hat{y}_j)]^{1/2}$
Variance of row demand:	(F2.14a) $V'(\,_r y_{jk}) = \sum_{i=1}^{I} [(y_{ji} - \hat{R}_j{}^* e_{ji})^2 * x_{ji}{}^* x_{ki}] / (n'_{jk} - 1)$
Variance of column demands:	(F2.15a) $V'(\,_c y_{jk}) = \sum_{i=1}^{I} [(y_{ki} - \hat{R}_k{}^* e_{ki})^2 * x_{ki}{}^* x_{ji}] / (n'_{jk} - 1)$
Standard error of row demands:	(F2.16a) $SE(\,_r y_{jk}) = [V'(\,_r y_{jk})]^{1/2}$
Standard error of demands:	(F2.17a) $SE(\,_c y_{jk}) = [V'(\,_c y_{jk})]^{1/2}$
Covariance of (between period) sample demands:	(F2.18a) $COV(y_j, y_k) = \sum_{i=1}^{I} [(y_{ji} - \hat{R}_j{}^* e_{ji})^* (y_{ki} - \hat{R}_k{}^* e_{ki})$ $* x_{ji}{}^* x_{ki}] / (n'_{jk} - 1)$
Correlation coefficient:	(F2.19a) $CORR(y_{jk}) = \dfrac{COV(y_i, y_k)}{[SE(\,_c y_{jk}) * SE(\,_r y_{jk})]}$
Coincident peak demand (period):	(F2.20a) $\hat{\tau}_j = \hat{R}_j{}^* \bar{E}_j$
Variance of coincident peak demand (total):	(F2.21a) $V(\hat{\tau}_j) = (1 - n_j / N_j) * (1 / n_j) * \sum_{i=1}^{I} [(y_{ji} - \hat{R}_j{}^* e_{ji})^2$ $* x_{ji}] / (n_j - 1)$
Standard error of coincident peak demand (total):	(F2.22a) $SE(\hat{\tau}_j) = [V(\hat{\tau}_j)]^{1/2}$
Variability of coincident peak demand (total):	(F2.23a) $VAR(\hat{\tau}_j) = V(\hat{\tau}_j)^* b_j + \sum_{k \neq j} [1 - (n_j + n_k) / (N_j + N_k)]$ $* b_k{}^* (1 / \bar{n}_{jk}) * COV(y_j, y_k)$

STATISTIC	FORMULA
Standard error of variability of coincident peak demand (period):	(F2.24a) $SE(\hat{\tau}_j) = [VAR(\hat{\tau}_j)]^{1/2}$
Mean coincident peak demand:	(F2.25a) $\hat{\bar{\tau}} = \sum_{j=1}^{J} \hat{\tau}_j{}^* b_j$
Variance of mean coincident peak demand:	(F2.26a) $V(\hat{\bar{\tau}}) = \sum_{j=1}^{J} V(\hat{\tau}_j)^* b_j^2 + 2^* \sum\sum_{j<k} [1-(n_j+n_k)/(N_j+N_k)]^* b_j{}^* b_k{}^* (1/\bar{n}_{jk})^* COV(y_j, y_k)$
Standard error of mean coincident peak demand:	(F2.27a) $SE(\hat{\bar{\tau}}) = [V(\hat{\bar{\tau}})]^{1/2}$

Customer Class Level

STATISTIC	FORMULA
Sample size:	(F2.1c) $n_j = \sum_{i=1}^{I} X_{ji}$
Average (between period) sample size:	(F2.2c) $\bar{n}_{jk} = (n_j + n_k)/2$
Common (between period) sample size:	(F2.3c) $n'_{jk} = \sum_{i=1}^{I} X_{ji}{}^* X_{ki}$
Estimated mean demand (Sample mean demand):	(F2.4c) $\bar{y}_j = \sum_{i=1}^{I} (y_{ji}{}^* x_{ji})/n$
Estimated mean energy (Sample mean energy):	(F2.5c) $\bar{e}_j = \sum_{i=1}^{I} (e_{ji}{}^* x_{ji})/n_j$
Ratio of mean demand to mean energy:	(F2.6c) $\hat{R}_j = \bar{y}_j/\bar{e}_j$
Estimated mean demand (ratio):	(F2.7c) $\hat{y}_j = \sum_{i=1}^{I} \hat{R}_j{}^* (e_{ji}{}^* x_{ji})/n_j$
Mean row demand (ratio):	(F2.8c) ${}_r\hat{y}_{jk} = \sum_{i=1}^{I} (\hat{R}_j{}^* e_{ji}{}^* x_{ji}{}^* x_{ki})/n'_{jk}$
Mean column demand (ratio):	(F2.9c) ${}_c\hat{y}_{jk} = \sum_{i=1}^{I} (\hat{R}_k{}^* e_{ki}{}^* x_{ki}{}^* x_{ji})/n'_{jk}$
Variance of sample demands:	(F2.10c) $V(y_j) = \sum_{i=1}^{I} [(y_{ji} - \bar{y}_j)^2 {}^* x_{ji}]/(n_j - 1)$

STATISTIC	**FORMULA**
Variance of sample energies:	(F2.11c) $V(e_j) = \sum_{i=1}^{I} [(e_{ji} - \bar{e}_j)^2 * x_{ji}]/(n_j - 1)$
Variance of estimated mean demand (ratio):	(F2.12c) $V(\hat{y}_j) = (1 - n_j/N_j)*(1/n_j)*\sum_{i=1}^{I} (y_{ji} - \hat{R}_j * e_{ji})^2 * x_{ji}]/(n_j - 1\ )$
Standard error of estimated mean demand:	(F2.13c) $SE(\hat{y}_j) = [V(\hat{y}_j)]^{1/2}$
Variance of row demand:	(F2.14c) $V'({}_r y_{jk}) = \sum_{i=1}^{I} [(y_{ji} - \hat{R}_j * e_{ji})^2 * x_{ji} * x_{ki}]/(n'_{jk} - 1)$
Variance of column demands:	(F2.15c) $V'({}_c y_{jk}) = \sum_{i=1}^{I} [(y_{ki} - \hat{R}_j * e_{ki})^2 * x_{ki} * x_{ji}]/(n'_{jk} - 1)$
Standard error of row demands:	(F2.16c) $SE({}_r y_{jk}) = [V'({}_r y_{jk})]^{1/2}$
Standard error of demands:	(F2.17c) $SE({}_c y_{jk}) = [V'({}_c y_{jk})]^{1/2}$
Covariance of (between period) sample demands:	(F2.18c) $COV(y_j, y_k) = \sum_{i=1}^{I} [(y_{ji} - \hat{R}_j * e_{ji})^* (y_{ki} - \hat{R}_k * e_{ki}) * x_{ji} * x_{ki}]\ /(n'_{jk} - 1)$
Correlation coefficient:	(F2.19c) $CORR(y_{jk}) = \frac{COV(y_i, y_k)}{[SE({}_c y_{jk}) * SE({}_r y_{jk})]}$
Coincident peak demand (period):	(F2.20c) $\hat{\tau}_j = \hat{R}_j * E_j$
Variance of coincident peak demand (total):	(F2.21c) $V(\hat{\tau}_j) = N_j^2 * (1 - n_j/N_j)*(1/n_j)*\sum_{i=1}^{I} [(y_{ji} - \hat{R}_j * e_{ji})^2 * x_{ji}]/(n_j - 1)$
Standard error of coincident peak demand (total):	(F2.22c) $SE(\hat{\tau}_j) = [V(\hat{\tau}_j)]^{1/2}$
Variability of coincident peak demand (period):	(F2.23c) $VAR(\hat{\tau}_j) = V(\hat{\tau}_j)^* b_j + \sum_{k \neq j} [1 - (n_j + n_k)/(N_j + N_k)] * b_k * N_j * N_k * (1/\bar{n}_{jk}) * COV(y_j, y_k)$
Standard error of variability of coincident peak demand (period):	(F2.24c) $SE(\hat{\tau}_j) = [VAR(\hat{\tau}_j)]^{1/2}$
Mean coincident peak demand:	(F2.25c) $\hat{\bar{\tau}} = \sum_{j=1}^{J} \hat{\tau}_j * b_j$

STATISTIC	**FORMULA**
Variance of mean coincident peak demand:	(F2.26c) $V(\hat{\bar{\tau}}) = \sum_{j=1}^{J} V(\hat{\tau}_j)^* b_j^2 + 2^* \sum_{j<k}\sum N_j{}^* N_k{}^* [1-(n_j+n_k)$ $/(N_j+N_k)]^* b_j{}^* b_k{}^* (1/\bar{n}_{jk})^* COV(y_j, y_k)$
Standard error of mean coincident peak demand:	(F2.27c) $SE(\hat{\bar{\tau}}) = [V(\hat{\bar{\tau}})]^{1/2}$

F.3 Stratified Concident Peak Analysis Equations (Mean-Per-Unit)

Let:

i = customer index, i = 1, 2, ..., I_h;
j = period index, j = 1, 2, ..., J (J $\leq$ 12);
h = strata index, h = 1, 2, ..., H, (H $\leq$ 99);
b_j = j-th period's weight;
N_j = total population for period j;
N_{hj} = population for strata h, period j;
Y_{hji} = i-th customer's demand (KW) for strata h, period j;
C_{hji} = i-th customer's status code (hexadecimal) for strata h, period j;
C = worst acceptable status code;

Define:

$$x_{hji} = \begin{cases} 1(\quad \text{if } \mathrm{C}_{hji} \leq C;) \\ 0 \quad \text{otherwise.} \end{cases}$$

$$W_{hj} = \begin{cases} N_{hj}/Nj \\ W^{*}_{h\,j,} \quad if \text{ externally supplied} \end{cases}$$

Average Customer Level

STATISTIC	FORMULA
Sample size:	(F3.1a) $n_{hj} = \sum_{i=1}^{I_h} X_{hji}$
Average (between period) sample size:	(F3.2a) $\bar{n}_{hjk} = (n_{hj} + n_{hk})/2$
Common (between period) sample size:	(F3.3a) $n'_{hjk} = \sum_{i=1}^{I} X_{hji} {}^{*} X_{hki}$
Estimated mean demand (Sample mean demand):	(F3.4a) $y_{hj} \equiv \bar{y}_{hj} = \sum_{i=1}^{I_h} (y_{hji} {}^{*} x_{hji})/n_{hj}$
Row demand (Common mean demand):	(F3.5a) ${}_{r}\hat{y}_{hjk} \equiv {}_{r}\bar{y}_{hjk} = \sum_{i=1}^{I_h} (y_{hji} {}^{*} x_{hji} {}^{*} x_{hki})/n'_{hjk}$
Column demand (Common mean demand):	(F3.6a) ${}_{c}\hat{y}_{hjk} \equiv {}_{c}\bar{y}_{hjk} = \sum_{i=1}^{I_h} (y_{hki} {}^{*} x_{hki} {}^{*} x_{hji})/n'_{hjk}$
Variance of sample demands:	(F3.7a) $V(y_{hj}) = \sum_{i=1}^{I_h} [(y_{hji} - \bar{y}_{hj})^2 {}^{*} x_{hji}]/(n_{hj} - 1)$
Variance of estimated mean demand:	(F3.8a) $V(\bar{y}_{hj}) = (1 - (n_{hj})/N_{hj}) {}^{*} V(y_{hj})/n_{hj}$

STATISTIC	FORMULA	
Standard error of estimated mean demand:	(F3.9a)	$SE(\bar{y}_{hj}) = [V(\bar{y}_{hj})]^{1/2}$
Common variance of sample demands (row j):	(F3.10a)	$V'({}_{r}y_{hjk}) = \sum_{i=1}^{I_h} [(y_{hji} - {}_{r}\bar{y}_{hjk})^2 * x_{hji} * x_{hki}] / (n'_{hjk} - 1)$
Standard error of sample demands (row j):	(F3.11a)	$SE({}_{r}y_{hjk}) = [V'({}_{r}y_{hjk})]^{1/2}$
Common variance of sample demands (column k):	(F3.12a)	$V'({}_{c}y_{hjk}) = \sum_{i=1}^{I_h} [(y_{hki} - {}_{c}\bar{y}_{hjk})^2 * x_{hki} * x_{hji}] / (n'_{hjk} - 1)$
Standard error of sample demands (column k):	(F3.13a)	$SE({}_{c}y_{hjk}) = [V'({}_{c}y_{hjk})]^{1/2}$
Covariance of (between period) sample demands (strata):	(F3.14a)	$COV(y_{hj}, y_{hk}) = \sum_{i=1}^{I_h} [(y_{hji} - {}_{r}\bar{y}_{hjk})^* (\bar{y}_{hki} - {}_{c}y_{hjk})$ $* x_{hji} * x_{hki}] / (n'_{hjk} - 1)$
Correlation coefficient (strata):	(F3.15a)	$CORR(y_{hjk}) = \frac{COV(y_{hj}, y_{hk})}{[SE({}_{r}y_{hjk}) * SE({}_{c}y_{hjk})]}$
Coincident peak demand (period):	(F3.16a)	$\hat{\tau}_j = \sum_{h=1}^{H} W_{hj} * \bar{y}_{hj}$
Variance of coincident peak demand (total):	(F3.17a)	$V(\hat{\tau}_j) = \sum_{h=1}^{H} W_{hj}^{2} * V(\bar{y}_{hj})$
Standard error of coincident peak demand (total):	(F3.18a)	$SE(\hat{\tau}_j) = [V(\hat{\tau}_j)]^{1/2}$
Variability of coincident peak demand (period):	(F3.19a)	$VAR(\hat{\tau}_j) = V(\hat{\tau}_j)^* b_j + \sum_{k \neq j} b_k * [\sum_{h=1}^{H} [1 - (n_{hj} + n_{hk}) /$ $(N_{hj} + N_{hk})] * (1/n_{hjk}) * W_{hj} * W_{hk} *$ $COV(y_{hj}, y_{hk})]$
Standard error of variability of coincident peak demand (period):	(F3.20a)	$SE(\hat{\tau}_j) = [VAR(\hat{\tau}_j)]^{1/2}$
Mean coincident peak demand (entire period):	(F3.21a)	$\hat{\tau} = \sum_{j=1}^{J} \hat{\tau}_j * b_j$

STATISTIC	**FORMULA**
Variance of mean coincident peak demand (entire period):	(F3.22a) $V(\hat{\bar{\tau}}) = \sum_{j=1}^{J} V(\hat{\tau}_j)^* b_j^2 + 2^* \sum_{h=1}^{H} \sum\sum_{j<k} [1-(n_{hj}+n_{hk})/(N_{hj}+N_{hk})]^* b_j^* b_k^* W_{hj}^* W_{hk}^* (1/\bar{n}_{hjk})^* COV(y_{hj}, y_{hk})$
Standard error of mean coincident peak demand (entire period):	(F3.23a) $SE(\tau) = [V(\tau)]^{1/2}$

Customer Class Level

STATISTIC	**FORMULA**
Sample size:	(F3.1c) $n_{hj} = \sum_{i=1}^{I_h} X_{hji}$
Average (between period) sample size:	(F3.2c) $\bar{n}_{hjk} = (n_{hj}+n_{hk})/2$
Common (between period) sample size:	(F3.3c) $n'_{hjk} = \sum_{i=1}^{I} X_{hji}^* X_{hki}$
Estimated mean demand (Sample mean demand):	(F3.4c) $\hat{y}_{hj} \equiv \bar{y}_{hj} = \sum_{i=1}^{I_h} (y_{hji}^* x_{hji})/n_{hj}$
Row demand (Common mean demand):	(F3.5c) ${}_r\hat{y}_{hjk} \equiv {}_r\bar{y}_{hjk} = \sum_{i=1}^{I_h} (y_{hji}^* x_{hji}^* x_{hki})/n'_{hjk}$
Column demand (Common mean demand):	(F3.6c) ${}_c\hat{y}_{hjk} \equiv {}_c\bar{y}_{hjk} = \sum_{i=1}^{I_h} (y_{hki}^* x_{hki}^* x_{hji})/n'_{hjk}$
Variance of sample demands:	(F3.7c) $V(y_{hj}) = \sum_{i=1}^{I_h} [(y_{hji} - \bar{y}_{hj})^{2*} x_{hji}]/(n_{hj}-1)$
Variance of estimated mean demand:	(F3.8c) $V(\bar{y}_{hj}) = (1-n_{hj}/N_{hj})^* V(y_{hj})/n_{hj}$
Standard error of estimated mean demand:	(F3.9c) $SE(\bar{y}_{hj}) = [V(\bar{y}_{hj})]^{1/2}$
Common variance of sample demands (row j):	(F3.10c) $V'({}_r y_{hjk}) = \sum_{i=1}^{I_h} [(y_{hji} - {}_r\bar{y}_{hjk})^{2*} X_{hji}^* X_{hki}]/(n'_{hjk}-1)$
Standard error of common sample demands (row j):	(F3.11c) $SE({}_r y_{hjk}) = [V'({}_r y_{hjk})]^{1/2}$
Common variance of sample demands (column k):	(F3.12c) $V'({}_c y_{hjk}) = \sum_{i=1}^{I_h} [(y_{hki} - {}_c\bar{y}_{hjk})^{2*} x_{hki}^* x_{hji}]/(n'_{hjk}-1)$

STATISTIC	**FORMULA**
Standard error of common variance (column k):	(F3.13c) $SE({}_{c}y_{hjk}) = [V'({}_{c}y_{hjk})]^{1/2}$
Covariance of (between period) sample demands (strata):	(F3.14c) $COV(y_{hj}, y_{hk}) = \sum_{i=1}^{I_h} [(y_{hji} - {}_{r}\bar{y}_{hjk}) * (y_{hki} - {}_{c}\bar{y}_{hjk})$ $* X_{hji} * X_{hki}] / (n'_{hjk} - 1)$
Correlation coefficient (strata):	(F3.15c) $CORR(y_{hjk}) = \dfrac{COV(y_{hj}, y_{hk})}{[SE({}_{r}y_{hjk}) * SE({}_{c}y_{hjk})]}$
Coincident peak demand (period):	(F3.16c) $\hat{\tau}_j = \sum_{h=1}^{H} W_{hj} * \bar{y}_{hj} * \mathrm{N}_j$
Variance of coincident peak demand (total):	(F3.17c) $V(\hat{\tau}_j) = \sum_{h=1}^{H} W_{hj}^2 * V(\bar{y}_{hj}) * \mathrm{N}_j^2$
Standard error of coincident peak demand (total):	(F3.18c) $SE(\hat{\tau}_j) = [V(\hat{\tau}_j)]^{1/2}$
Variability of coincident peak demand (period):	(F3.19c) $VAR(\hat{\tau}_j) = V(\hat{\tau}_j) * b_j + \sum_{k \neq j} b_k * [\sum_{h=1}^{H} [1 - (n_{hj} + n_{hk}) /$ $(N_{hj} + N_{hk})] * (1/\bar{n}_{hjk}) * W_{hj} * W_{hk} * \mathrm{N}_j * \mathrm{N}_k *$ $COV(y_{hj}, y_{hk})]$
Standard error of variability of coincident peak demand (period):	(F3.20c) $SE(\hat{\tau}_j) = [VAR(\hat{\tau}_j)]^{1/2}$
Mean coincident peak demand (entire period):	(F3.21c) $\hat{\bar{\tau}} = \sum_{j=1}^{J} \hat{\tau}_j * b_j$
Variance of mean coincident peak demand (entire period):	(F3.22c) $V(\hat{\bar{\tau}}) = \sum_{j=1}^{J} V(\hat{\tau}_j) * b_j^2 + 2 * \sum_{h=1}^{H} \sum\sum_{j<k}$ $[1 - (n_{hj} + n_{hk}) / (N_{hj} + N_{hk})] * b_j * b_k *$ $N_j * \mathrm{N}_k * W_{hj} * W_{hk} * (1/\bar{n}_{hjk}) COV(y_{hj}\ y_{hk})$
Standard error of mean coincident peak demand (entire period):	(F3.23c) $SE(\hat{\bar{\tau}}) = [V(\hat{\bar{\tau}})]^{1/2}$

F.4 Stratified Coincident Peak Analysis Equations (Combined Ratio)

Let:

i = customer index, $i = 1, 2, ..., I_h$;
j = period index, $j = 1, 2, ..., J$ ($J \leq 12$);
h = strata index, $h = 1, 2, ..., H$, ($H \leq 99$);
b_j = j-th period's weight;
N_j = total population for period j;
N_{hj} = population for strata h, period j;
Y_{hji} = i-th customer's demand (KW) for strata h, period j;
e_{hji} = i-th customer's (KWH) billed energy for strata h, period j;
E_j = total billed energy for the entire customer class in period j;
C_{hji} = i-th customer's status code (hexadecimal) for strata h, period j;
C = worst acceptable status code;

Define:

$$x_{hji} = \begin{cases} 1 & \text{if } C_{hji} \leq C; \\ 0 & \text{otherwise.} \end{cases}$$

$$W_{hj} = \begin{cases} N_{hj}/Nj \\ W^*_{hj}, & if \text{ externally supplied} \end{cases}$$

$$\bar{E}_j = E_j/N_j$$

Average Customer Level

STATISTIC	FORMULA
Sample size:	(F4.1a) $n_{hj} = \sum_{i=1}^{I_h} X_{hji}$
Average (between period) sample size:	(F4.2a) $\bar{n}_{hjk} = (n_{hj} + n_{hk})/2$
Common (between period) sample size:	(F4.3a) $n'_{hjk} = \sum_{i=1}^{I} X_{hji} * X_{hki}$
Estimated mean demand (Sample mean demand):	(F4.4a) $\bar{y}_{hj} = \sum_{i=1}^{I_h} (y_{hji} * x_{hji})/n_{hj}$
Estimated mean energy (Sample mean energy):	(F4.5a) $\bar{e}_{hj} = \sum_{i=1}^{I_h} (e_{hji} * x_{hji})/n_{hj}$
Strata separate ratio (demand to energy):	(F4.51a) $\hat{R}_{hj} = \bar{y}_{hj}/\bar{e}_{hj}$
Combined ratio (demand to energy):	(F4.6a) $\hat{R}_j = \sum_{h=1}^{H} W_{hj} * \bar{y}_{hj} / \sum_{h=1}^{H} W_{hj} * \bar{e}_{hj}$

STATISTIC	FORMULA
Estimated mean demand (combined ratio):	(F4.7a) $\hat{y}_{hj} = \sum_{i=1}^{I_h} (R_j * e_{hji} * x_{hji}) / n_{hj}$
Estimated mean demand (row demand):	(F4.8a) $_r\hat{y}_{hjk} = \sum_{i=1}^{I_h} (R_j * e_{hji} * x_{hji} * x_{hki}) / n'_{hjk}$
Estimated mean demand (column demand):	(F4.9a) $_c\hat{y}_{hjk} = \sum_{i=1}^{I_h} (R_{hk} * e_{hki} * x_{hji} * x_{hki}) / n'_{hjk}$
Variance of sample demands:	(F4.10a) $V(y_{hj}) = \sum_{i=1}^{I_h} [(y_{hji} - \bar{y}_{hj})^2 * x_{hji}] / (n_{hj} - 1)$
Variance of sample energies:	(F4.11a) $V(e_{hj}) = \sum_{i=1}^{I_h} [(e_{hji} - \bar{e}_{hj})^2 * x_{hji}] / (n_{hj} - 1)$
Variance of estimated mean demand:	(F4.12a) $V(\hat{y}_{hj}) = (1 - n_{hj}/N_{hj}) * (1/n_{hj}) * \sum_{i=1}^{I_h} [(y_{hji} - \hat{R}_j * e_{hji})^2 * x_{hji}] / (n_{hj} - 1)$
Standard error of estimated mean demand:	(F4.13a) $SE(\hat{y}_{hj}) = [V(\hat{y}_{hj})]^{1/2}$
Variance of row demands:	(F4.14a) $V'(_r y_{hjk}) = \sum_{i=1}^{I_h} [(y_{hji} - \hat{R}_j * e_{hji})^2 * x_{hji} * x_{hki}] / (n'_{hjk} - 1)$
Standard error of row demand:	(F4.15a) $SE(_r y_{hjk}) = [V'(_r y_{hjk})]^{1/2}$
Variance of column demands:	(F4.16a) $V'(_c y_{hjk}) = \sum_{i=1}^{I_h} [(y_{hki} - \hat{R}_k * e_{hki})^2 * x_{hki} * x_{hji}] / (n'_{hjk} - 1)$
Standard error of column demands:	(F4.17a) $SE(_c y_{hjk}) = [V'(_c y_{hjk})]^{1/2}$
Covariance of (between period) sample demands:	(F4.18a) $COV(y_{hj}, y_{hk}) = \sum_{i=1}^{I_h} [(y_{hji} - \hat{R}_j * e_{hji}) * (y_{hki} - \hat{R}_k * e_{hki}) * X_{hji} * X_{hki}] / (n'_{hjk} - 1$
Correlation coefficient:	(F4.19a) $CORR(y_{hjk}) = \frac{COV(y_{hj}, y_{hk})}{[SE(_r y_{hjk}) * SE(_c y_{hjk})]}$
Coincident peak demand (period):	(F4.20a) $\hat{\tau}_j = \hat{R}_j * \bar{E}_j$

STATISTIC	FORMULA
Variance of coincident peak demand (total):	(F4.21a) $V(\hat{\tau}_j) = \sum_{h=1}^{H} W_{hj}^2 * V(\hat{y}_{hj})$
Standard error of coincident peak demand (total):	(F4.22a) $SE(\hat{\tau}_j) = [V(\hat{\tau}_j)]^{1/2}$
Correlation coefficient (total):	(F4.23a) $CORR(y_{jk}) = \sum_{h=1}^{H} [W_{hj} * W_{hk} * COV(y_{hj}, y_{hk})] /$ $\{ [\sum_{j=1}^{H} W_{hj}^2 * V'({}_{r}y_{hjk})] * [\sum_{h=1}^{H} W_{hk}^2 * V'({}_{c}y_{hjk})] \}^{1/2}$
Variability of coincident peak:	(F4.24a) $VAR(\hat{\tau}_j) = V(\hat{\tau}_j)^* b_j + \sum_{j \neq k} b_k * [\sum_{h=1}^{H} [1 - (n_{hj} + n_{hk}) /$ $(N_{hj} + N_{hk})] * (1/\bar{n}_{hjk})$ $* W_{jk} * W_{hk} * COV(y_{hj}, y_{hk})]$
Standard error of variability of coincident peak demand (period):	(F4.25a) $SE(\hat{\tau}_j) = [VAR(\hat{\tau}_j)]^{1/2}$
Mean coincident peak demand (entire period):	(F4.26a) $\hat{\bar{\tau}} = \sum_{j=1}^{J} \hat{\tau}_j * b_j$
Variance of mean coincident peak demand:	(F4.27a) $V(\hat{\tau}) = \sum_{j=1}^{J} V(\hat{\tau}_j)^* b_j^2 + 2^* \sum_{h=1}^{H}$ $\sum\sum_{j<k} [1 - (n_{hj} + n_{hk}) / (N_{hj} + N_{hk})] * b_j * b_k *$ $W_{hj} * W_{hk} * (1/\bar{n}_{hjk}) * COV(y_{hj}, y_{hk})$
Standard error of mean coincident peak demand (entire period):	(F4.28a) $SE(\tau) = [V(\hat{\bar{\tau}})]^{1/2}$

Customer Class Level

STATISTIC	FORMULA
Sample size:	(F4.1c) $n_{hj} = \sum_{i=1}^{I_h} X_{hji}$
Average (between period) sample size:	(F4.2c) $\bar{n}_{hjk} = (n_{hj} + n_{hk})/2$
Common (between period) sample size:	(F4.3c) $n'_{hjk} = \sum_{i=1}^{I} X_{hji} * X_{hki}$
Estimated mean demand (Sample mean demand):	(F4.4c) $\bar{y}_{hj} = \sum_{i=1}^{I_h} (y_{hji} * x_{hji}) / n_{hj}$
Estimated mean energy (Sample mean energy):	(F4.5c) $\bar{e}_{hj} = \sum_{i=1}^{I_h} (e_{hji} * x_{hji}) / n_{hj}$
Strata separate ratio (demand to energy):	(F4.51c) $\hat{R}_j = \bar{y}_{hj} / \bar{e}_{hj}$
Combined ratio (demand to energy):	(F4.6c) $\hat{R}_j = \sum_{h=1}^{H} W_{hj} * \bar{y}_{hj} / \sum_{h=1}^{H} W_{hj} * \bar{e}_{hj}$
Estimated mean demand (combined ratio):	(F4.7c) $\hat{y}_{hj} = \sum_{i=1}^{I_h} (\hat{R}_j * e_{hji} * x_{hji}) / n_{hj}$
Estimated mean demand (row demand):	(F4.8c) ${}_r\hat{y}_{hjk} = \sum_{i=1}^{I_h} (\hat{R}_j * e_{hji} * x_{hji} * x_{hki}) / n'_{hjk}$
Estimated mean demand (column demand):	(F4.9c) ${}_c\hat{y}_{hjk} = \sum_{i=1}^{I_h} (\hat{R}_k * e_{hki} * x_{hji} * x_{hki}) / n'_{hjk}$
Variance of sample demands:	(F4.10c) $V(y_{hj}) = \sum_{i=1}^{I_h} [(y_{hji} - \bar{y}_{hj})^2 * x_{hji}] / (n_{hj} - 1)$
Variance of sample energies:	(F4.11c) $V(e_{hj}) = \sum_{i=1}^{I_h} [(e_{hji} - \bar{e}_{hj})^2 * x_{hji}] / (n_{hj} - 1)$

STATISTIC	FORMULA
Variance of estimated mean demand:	(F4.12c) $d_{hji} = y_{hji} - \hat{R}_j e_{hji}$ $\bar{d}_{hj} = \bar{y}_{hj} - \hat{R}_j \bar{e}_{hj}$ $\bar{d}_{hjk} = \left(\sum_{i=1}^{I_h} d_{hji} x_{hji} x_{hki} \right) / n'_{hjk}$ $V(\hat{y}_{hj}) = (1 - n_{hj}/N_{hj})(1/n_{hj}) \sum_{i=1}^{I_h} [(d_{hji} - \bar{d}_{hj})^2 x_{hji}] / (n_{hj} - 1)$
Standard error of estimated mean demand:	(F4.13c) $SE(\hat{y}_{hj}) = [V(\hat{y}_{hj})]^{1/2}$
Variance of row demands:	(F4.14c) $V'({}_{r}y_{hjk}) = \sum_{i=1}^{I_h} (y_{hji} - \hat{R}_j {*} e_{hji})^2 {*} x_{hji} {*} x_{hki}] / (n'_{hjk} - 1)$
Standard error of row demand:	(F4.15c) $SE({}_{r}y_{hjk}) = [V'({}_{r}y_{hjk})]^{1/2}$
Variance of column demands:	(F4.16c) $V'({}_{c}y_{hjk}) = \sum_{i=1}^{I_h} [(y_{hki} - \hat{R}_k {*} e_{hki})^2 {*} x_{hki} {*} x_{hji}] / (n'_{hjk} - 1)$
Standard error of column demands:	(F4.17c) $SE({}_{c}y_{hjk}) = [V'({}_{c}y_{hjk})]^{1/2}$
Covariance of (between period) sample demands:	(F4.18c) $COV(y_{hj}, y_{hk}) =$ $\sum_{i=1}^{I_h} [(d_{hji} - \bar{d}_{hjk})(d_{hki} - \bar{d}_{hkj}) x_{hji} x_{hki}] / (n'_{hjk} - 1)$
Correlation coefficient:	(F4.19c) $CORR(y_{hjk}) = \dfrac{COV(y_{hj}, y_{hk})}{[SE({}_{r}y_{hjk}) {*} SE({}_{c}y_{hjk})]}$
Coincident peak demand (period):	(F4.20c) $\hat{\tau}_j = \hat{R}_j {*} E_j$
Variance of coincident peak demand (total):	(F4.21c) $V(\hat{\tau}_j) = N_j^2 {*} \sum_{h=1}^{H} W_{hj}^2 {*} V(\hat{y}_{hj})$
Standard error of coincident peak demand (total):	(F4.22c) $SE(\hat{\tau}_j) = [V(\hat{\tau}_j)]^{1/2}$

STATISTIC	FORMULA
Correlation coefficient (total):	(F4.23c) $CORR(y_{jk})= \sum_{h=1}^{H} [W_{hj}*W_{hk}*COV(y_{hj},y_{hk})]/$ $\{ [\sum_{j=1}^{H} W_{hj}^{2}* V'(_{r}y_{hjk})]$ $* [\sum_{h=1}^{H} W_{hk}^{2} *V'(_{c}y_{hjk})] \}^{1/2}$
Variability of coincident peak:	(F4.24c) $VAR(\hat{\tau}_j)= V(\hat{\tau}_j)^{*} b_j + \sum_{j \neq k} b_k* [\sum_{h=1}^{H} [1-(n_{hj}+n_{hk})/$ $(N_{hj}+N_{hk})]*(1/\bar{n}_{hjk})*N_j*N_k$ $*W_{jk}^{*}W_{hk}*COV(y_{hj,}\, y_{hk})]$
Standard error of variability of coincident peak demand (period):	(F4.25c) $SE(\hat{\tau}_j)= [VAR(\hat{\tau}_j)]^{1/2}$
Mean coincident peak demand (entire period):	(F4.26c) $\hat{\bar{\tau}}= \sum_{j=1}^{J} \hat{\tau}_j^{*} b_j$
Variance of mean coincident peak demand:	(F4.27c) $V(\hat{\tau})= \sum_{j=1}^{J} V(\hat{\tau}_j)^{*} b_j^{2} + 2^{*} \sum_{h=1}^{H}$ $\sum\sum_{j<k} [1-(n_{hj}+n_{hk})/(N_{hj}+N_{hk})]*N_j*N_k*b_j^{*}b_k*$ $W_{hj}^{*}W_{hk}*(1/\bar{n}_{hjk})*COV(y_{hj},y_{hk})$
Standard error of mean coincident peak demand (entire period):	(F4.28c) $SE(\hat{\bar{\tau}})= [V(\hat{\bar{\tau}})]^{1/2}$

Appendix G

Domains Analysis Ratio Equations

This appendix documents the domains analysis ratio calculations used in Oracle Utilities Load Analysis. This material assumes a basic understanding of statistics, load research calculations, and Oracle Utilities Load Analysis's operation.

Non-Stratified Domains Analysis Ratio Equations

Let:

j = index for each domain, j = 1,2, ..., J
r = index for each customer, r = 1,2, ..., R
t = index for each time, t = 1,2, ..., T
N = population size
E_j = total billed energy for domain j over the analysis period
E = total billed energy for domain j over the analysis period
$d_{r,j,t}$ = r-th customer's demand (KW) in domain j for time interval t
$e_{r,j,t}$ = r-th customer's total energy (KWH) in domain j for time interval t
$e_{r,t}$ = r-th customer's total energy (KWH) for time interval t
$c_{r,t}$ = r-th customer's status code (hexadecimal) for time interval t
C = Worst acceptable status code (hexadecimal)
a = 1 - level of significance used in relative accuracy calculation
$t_{a/2}$ = student's t-variate

Define:

$$ {}_{r,j,t} = \begin{cases} 1 \ \text{ if } \mathrm{C}_{r,t} < \ = \ C \text{ and customer is in domain;} \\ 0 \ \text{ otherwise} \end{cases} $$

$$ n_{t,p} = \begin{cases} 1 \ \text{ if interval is in Time-of-Use Period} \\ 0 \text{ otherwise}_{\text{t}} \end{cases} $$

$$ f_{r,p} = \left(\frac{\sum_{t \in p} m_{t,p}}{\sum_{t \in p} x_{r,t}} \right) \qquad \text{(}\textit{energy}\text{ proration factor for customer r for Time-of-Use period p)} $$

STATISTIC	**FORMULA**
Sample size:	$n_t = \sum_{r=1}^{R} X_{r,t}$
Domain size:	$n_{j,t} = \sum_{r=1}^{R} X_{r,j,t}$
Domain mean demand:	$\bar{d}_{j,t} = \sum_{r=1}^{R} \frac{d_{r,t} * x_{r,j,t}}{n_t}$
Individual customer total energy:	$e_r = \sum_{p=1}^{P} \sum_{t=1}^{T} [d_{r,t} * m_{t,p} * x_{r,t}] * (f_{r,p})$
Domain mean energy:	$\bar{e}_{j,t} = \sum_{r=1}^{R} \frac{e_{r,t} * x_{r,j,t}}{n_t}$
Sample mean energy:	$\bar{e}_t = \sum_{r=1}^{R} \frac{e_{r,t} * x_{r,t}}{n_t}$
Ratio (Domain total billed energy unknown):	$R_{1(t)} = \frac{\bar{d}_{j,t}}{e_t}$
Ratio (Domain total billed energy known):	$R_{2(t)} = \frac{\bar{d}_{j,t}}{e_{j,t}}$
Standard deviation of domain demands:	$s(d_{j,t}) = \sqrt{\left[\sum_{r=1}^{R} \frac{(d_{r,t} * x_{r,j,t} - \bar{d}_{j,t})^2}{n_t - 1} \right]}$
Variance of domain demands:	$V(d_{j,t}) = [s(d_{j,t})]^2$
Standard deviation of domain energies:	$s(e_{j,t}) = \sqrt{\left[\sum_{r=1}^{R} \frac{(e_{r,t} * x_{r,j,t} - \bar{e}_{j,t})^2}{n_t - 1} \right]}$
Variance of domain energy:	$V(e_{j,t}) = [s(e_{j,t})]^2$
Standard deviation of sample energies:	$s(e_t) = \sqrt{\left[\sum_{r=1}^{R} \frac{(e_{r,t} * x_{r,t} - \bar{e}_t)^2}{n_t - 1} \right]}$

STATISTIC	**FORMULA**
Variance of sample energy:	$V(e_t) = [s(e_t)]^2$
Domain total demand (KW) (Domain total billed energy unknown):	$\hat{\tau}_{j,t} = E * R_{1(t)}$
Domain total demand (KW) (Domain total billed energy known):	$\hat{\tau}_{j,t} = E_j * R_{2(t)}$
Covariance between domain energy and demand (Domain total billed energy unknown):	$C_t = \sum_{r=1}^{R} \frac{(d_{r,t} * x_{r,j,t} - \bar{d}_{j,t}) * (e_{r,t} * x_{r,t} - \bar{e}_t)}{n_t - 1}$
Covariance between domain energy and demand (Domain total billed energy known):	$C_{jt} = \sum_{r=1}^{R} \frac{(d_{r,t} * x_{r,j,t} - \bar{d}_{j,t}) * (e_{r,t} * x_{r,j,t} - \bar{e}_{j,t})}{n_t - 1}$
Q term for standard error of domain total calculation (Domain total billed energy unknown):	$Q_t = V(d_{j,t}) + R^2_{1(t)} * V(e_t) - 2 * R_{1(t)} * C_t$
Q term for standard error of domain total calculation (Domain total billed energy known):	$Q_t = V(d_{j,t}) + R^2_{2(t)} * V(e_{j,t}) - 2 * R_{2(t)} * C_{j,t}$
Variance of the domain total demand (KW):	$V(\hat{\tau}_{j,t}) = \left[\frac{N^2 \left(1 - \frac{n_t}{N}\right)}{n_t} \right] * Q_t$
Standard error of the domain total demand (KW):	$s(\hat{\tau}_{j,t}) = \sqrt{[V(\tau_{j,t})]}$
Relative accuracy:	$A_t = \frac{s(\hat{\tau}_{j,t}) * t_{a/2,df(t)}}{\hat{\tau}_{j,t}}$
Degrees of freedom:	$df_t = n_t - 1$

Required Conditions for the Correct Application of Domains Ratio Estimation

Let:

$CV(\bar{d}_{j,t})$ = Coefficient of variation for domain mean demand;

$CV(\bar{e}_{j,t})$ = Coefficient of variation for domain mean energy;

$CV(\bar{e}_t)$ = Coefficient of variation for sample energy (use when domain total billed energy unknown);

n_t = Sample size for interval of time t;

Conditions:

(1) $$CV(\bar{d}_{j,t}) = \sqrt{\left[\frac{(1 - n_t/N) * V(\bar{d}_{j,t})}{(\bar{d}_{j,t})}\right]} \le 0.2$$

(2) $$CV(\bar{e}_{j,t}) = \sqrt{\left[\frac{(1 - n_t/N) * V(\bar{e}_{j,t})}{(\bar{e}_{j,t})}\right]} \le 0.2$$

or

$$CV(\bar{e}_t) = \sqrt{\left[\frac{(1 - n_t/N) * V(\bar{e}_t)}{(\bar{e}_t)}\right]} \le 0.2$$

3) $n_t \ge 30$ (*for* all intervals t in the analysis period`

Combined (Stratified) Ratio Analysis Equations

Let:

j = Index for each domain, $j = 1,2, ..., J$;

r = Index for each customer, $r = 1,2, ..., R$;

s = Index for each stratum within the sample, $s = 1,2, ..., S$;

t = Index for each time, $t = 1, 2, ..., T$;

N = Population size;

N_s = Strata population;

E_j = Total billed energy for domain j over the analysis period;

E = Total billed energy for the population over the analysis period;

$d_{r,j,s,t}$ = Demand (KW) for the r-th customer in domain j, stratum s for time interval t;

$e_{r,j,s,t}$ = Total energy (KWH) for the r-th customer in domain j, stratum s for time interval t;

$e_{r,s,t}$ = Total energy (KWH) for the r-th customer in stratum s for time interval t;

$c_{r,s,t}$ = r-th customer's status code (hexadecimal) in stratum s for time interval t

C = Worst acceptable status code (hexadecimal);

a = 1 - level of significance used in relative accuracy calculation;

$Z_{a/2}$ = Normal variate;

Define:

$$x_{r,j,s,t} = \begin{cases} 1 \text{ if } C_{r,s,t} <= C \text{ and customer is in domain;} \\ 0 \text{ otherwise} \end{cases}$$

$$m_{t,p} = \begin{cases} 1 \text{ if interval,}_t \text{is in Time-of-Use Period p} \\ 0 \text{ otherwise} \end{cases}$$

$$f_{r,p} = \frac{\sum_{t \in p} m_{t,p}}{\sum_{t \in p} x_{r,s,t}} \quad (\textit{energy} \text{ proration factor for customer r for Time-of-Use period p)}$$

weighting factor for stratum s

$$W_s = \begin{cases} W_s & \text{if externally supplied weighting factor} \\ N_s / N \end{cases}$$

STATISTIC	**FORMULA**
Sample (Strata) size;	$n_{s,t} = \sum_{r=1}^{R} X_{r,s,t}$
Sample size:	$n_t = \sum_{s=1}^{S} n_{s,t}$
Domain (Strata) size:	$n_{s,j,t} = \sum_{r=1}^{R} X_{r,s,j,t}$
Domain size:	$n_{j,t} = \sum_{s=1}^{S} n_{s,j,t}$
Domain mean demand:	$\bar{d}_{j,s,t} = \sum_{r=1}^{R} \frac{d_{r,j,s,t} * x_{r,j,s,t}}{n_{s,t}}$
Individual customer total energy:	$e_{r,s} = \sum_{p=1}^{P} \sum_{t=1}^{T} [d_{r,s,t} * m_{t,p} * x_{r,s,t}] * (f_{r,p})$
Domain mean energy:	$\bar{e}_{s,j,t} = \sum_{r=1}^{R} \frac{e_{r,s,j} * x_{r,s,j,t}}{n_{s,t}}$
Sample mean energy:	$\bar{e}_{s,t} = \sum_{r=1}^{R} \frac{e_{r,s} * x_{r,s,t}}{n_{s,t}}$
Combined ratio (Domain total billed energy unknown):	$R_{1(t)} = \left[\frac{\sum_{s=1}^{S} W_s * d_{s,j,t} \quad \bar{d}_{j,t}}{\sum_{s=1}^{S} W_s * \bar{e}_{s,t} \quad = \overline{\bar{e}_t}} \right]$

STATISTIC	**FORMULA**
Combined ratio (Domain total billed energy known):	$R_{2(t)} = \left[\dfrac{\sum_{s=1}^{S} W_s * \bar{d}_{s,j,t}}{\sum_{s=1}^{S} W_s * \bar{e}_{s,t}} = \dfrac{\bar{d}_{j,t}}{\bar{e}_{j,t}} \right]$
Standard deviation of domain demands:	$s(d_{s,j,t}) = \sqrt{\left[\sum_{r=1}^{R} \dfrac{(d_{r,s,t} * x_{r,s,j,t} - \bar{d}_{s,j,t})^2}{n_{s,t} - 1} \right]}$
Variance of domain demands:	$V(d_{s,j,t}) = [s(d_{s,j,t})]^2$
Standard deviation of domain energies:	$s(e_{s,j,t}) = \sqrt{\left[\sum_{r=1}^{R} \dfrac{(e_{r,s,t} * x_{r,s,j,t} - \bar{e}_{s,j,t})^2}{n_{s,t} - 1} \right]}$
Variance of domain energy:	$V(e_{s,j,t}) = [s(e_{s,j,t})]^2$
Standard deviation of sample energies:	$s(e_{s,t}) = \sqrt{\left[\sum_{r=1}^{R} \dfrac{(e_{r,s,t} * x_{r,s,t} - \bar{e}_{s,t})^2}{n_{s,t} - 1} \right]}$
Variance of sample energy:	$V(e_{s,t}) = [s(e_{s,t})]^2$
Domain total demand (KW) (Domain total billed energy unknown):	$\hat{\tau}_{j,t} = E * R_{1(t)}$
Domain total demand (KW) (Domain total billed energy known):	$\tau_{j,t} = E_j * R_{2(t)}$
Covariance between domain energy and demand (Domain total billed energy unknown):	$C_{s,t} = \sum_{r=1}^{K} \dfrac{(d_{r,s,t} * x_{r,s,j,t} - \bar{d}_{s,j,t}) * (e_{r,s,t} * x_{r,s,t} - \bar{e}_{s,t})}{n_{s,t} - 1}$
Covariance between domain energy and demand (Domain total billed energy known):	$C_{s,j,t} = \sum_{r=1}^{K} \dfrac{(d_{r,s,t} * x_{r,s,j,t} - \bar{d}_{s,j,t}) * (e_{r,s,t} * x_{r,s,j,t} - \bar{e}_{s,j,t})}{n_{s,t} - 1}$
Q term of strata for standard error of domain total calculation (Domain total billed energy unknown):	$Q_{s,t} = V(d_{s,j,t}) + R_{1(t)}^2 * V(e_{s,t}) - 2 * R_{1(t)} * C_{s,t}$
Q term of strata for standard error of domain total calculation (Domain total billed energy known):	$Q_{s,t} = V(d_{s,j,t}) + R_{2(t)}^2 * V(e_{s,j,t}) - 2 * R_{2(t)} * C_{s,j,t}$
Variance of the domain total demand (KW):	$V(\hat{\tau}_{j,t}) = \sum_{s=1}^{S} \left[\dfrac{(W_s * N)^2 (1 - \frac{n_{s,t}}{N_s})}{n_{s,t}} * Q_{s,t} \right]$
Standard error of the domain total demand (KW):	$s(\hat{\tau}_{j,t}) = \sqrt{[V(\hat{\tau}_{j,t})]}$

STATISTIC	**FORMULA**
Relative accuracy:	$A_t = \frac{s(\hat{\tau}_{j,t})^{*}Z_{a/2,df(t)}}{\hat{\tau}_{j,t}}$

Required Conditions for the Correct Application of Domains Ratio Estimation

Let:

$CV(\bar{d}_{j,t})$ = Coefficient of variation for domain mean demand;

$CV(\bar{e}_{j,t})$ = Coefficient of variation for domain mean energy;

$CV(\bar{e}_t)$ = Coefficient of variation for sample energy (use when domain total billed energy unknown);

$n_{s,t}$ = Sample size for interval of time t for strata s;

Conditions:

1) $$\mathrm{CV}(\bar{e}_{j,t}) = \sqrt{\left[\frac{(1-n_t/N)^{*}V(\bar{e}_{j,t})}{(\bar{e}_{j,t})}\right]} \le 0.$$

or

$$\mathrm{CV}(\bar{e}_t) = \sqrt{\left[\frac{(1-n_t/N)^{*}V(\bar{e}_t)}{(\bar{e}_t)}\right]} \le 0.2$$

(2) $\sum_{s=1}^{S} n_{s,t} \ge 30$ (for all intervals t in the analysis period)

Average Day Statistics

Average day statistics are computed from a sample across a set of customers and across a set of days. Since samples from the same customer or separate days are not completely independent, Oracle Utilities Load Analysis cannot rigorously compute standard error, degrees of freedom or relative accuracy statistics. Instead Oracle Utilities Load Analysis reports a Relative Error Measure using the standard error equation, where the sample size is the total number of observations across customers and days. This Relative Error cannot be interpreted as a standard error because it would overstate the accuracy of the estimates.

Appendix H

Domains Analysis Mean Per Unit Equations

This appendix documents the domains analysis mean per unit calculations used in Oracle Utilities Load Analysis. This material assumes a basic understanding of statistics load research calculations, and Oracle Utilities Load Analysis's operation.

G.1 Non-Stratified Domains Analysis Mean-Per-Unit Equations

Let:

j = index for each domain, $j = 1, 2, ..., J$;
r = index for each customer, $r = 1, 2, ..., R$;
t = index for each time, $t = 1, 2, ..., T$;
N = population size;
Nj = domain size;
$d_{r,j,t}$ = r^{th} customer's demand (kW) in domain j for time t;
$c_{r,t}$ = r_{th} customer's status code (hexadecimal) for time t;
C = worst acceptable status code (hexadecimal);
a = 1 - level of significance used in relative accuracy calculation;
$t_{a/2}$ = student's t-variate;
d_j = demand of only those customers in domain j;

Define:

$$X_{r,t,j} = \begin{cases} 1 & \text{if } \mathrm{C}_{r,t} \leq C \text{ and customer is in domain;} \\ 0 & \text{otherwise.} \end{cases}$$

STATISTIC	FORMULA
Sample size:	$n_t = \sum_{r=1}^{R} x_{r,t}$
Domain size:	$n_{j,t} = \sum_{r=1}^{R} x_{r,j,t}$
Domain total demand (domain population unknown):	$\hat{\tau}(d_{j,t}) = N \left[\frac{\sum_{r=1}^{R} d_{r,t} * x_{r,j,t}}{n_{r,t}} \right]$
Domain total demand (domain population known):	$\hat{\tau}(d_{j,t}) = N_j \left[\frac{\sum_{r=1}^{R} d_{r,t} * x_{r,j,t}}{n_{j,t}} \right]$
Domain standard error (domain population unknown):	$e_{j,t} = N * \sqrt{\left(1 - \frac{n_t}{N}\right) \left[\frac{\sum_{r=1}^{R} d_{r,t}^2 * x_{r,j,t} - \frac{\left(\sum_{r=1}^{R} d_{r,t} * x_{r,j,t}\right)}{n_t}}{n_t(n_t - 1)} \right]^2}$
Domain standard error (domain population known):	$e_{j,t} = N_j * \sqrt{\left(1 - \frac{n_{j,t}}{N_j}\right) \left[\frac{\sum_{r=1}^{R} d_{r,t}^2 * x_{r,j,t} - \frac{\left(\sum_{r=1}^{R} d_{r,t} * x_{r,j,t}\right)}{n_{j,t}}}{n_{j,t}(n_{j,t} - 1)} \right]^2}$
Degrees of freedom:	$df_t = n_t - 1$
Relative accuracy:	$A_t = se(\hat{\tau}_{r,j}) / \hat{\tau}_{r,j} * t_{a/2,df}$

G.2 Stratified Domains Analysis Mean-Per-Unit Equations

Let:

j = index for each domain, $j = 1, 2, ..., J$;
s = index for each stratum, $s = 1, 2, ..., S$;
r = index for each customer, $r = 1, 2, ..., R$;
t = index for each time, $t = 1, 2, ..., T$;
N_s = population size in stratum s;
$N_{s,j}$ = domain size in stratum s;
$d_{r,s,j,t}$ = r^{th} customer's demand (kW) in stratum s, domain j for time t;
$c_{r,s,t}$ = r_{th} customer's status code (hexadecimal) in stratum s for time t;
C = worst acceptable status code (hexadecimal);
a = 1 - level of significance used in relative accuracy calculation;
$t_{a/2}$ = student's t-variate;

Define:

$$X_{r,s,t,j} = \begin{cases} 1 & \text{if } C_{r,s,t} \le C \text{ and customer is in domain;} \\ 0 & \text{otherwise;} \end{cases}$$

$$N = \sum_{s=1}^{S} N_s$$

$$W_s = \begin{cases} W_s & \text{if externally supplied;} \\ N_s/\text{N} & \text{otherwise.} \end{cases}$$

STATISTIC	**FORMULA**
Sample (Strata) size:	$n_{s,t} = \sum_{r=1}^{R} x_{r,s,t}$
Sample size:	$n_t = \sum_{s=1}^{S} n_{s,t}$
Domain (Strata) size:	$n_{s,j,t} = \sum_{r=1}^{R} x_{r,s,j,t}$
Domain size:	$n_{j,t} = \sum_{s=1}^{S} n_{s,j,t}$
Domain total demand (domain population unknown):	$\hat{\tau}(d_{j,t}) = \sum_{s=1}^{S} N_s * W_s \left[\frac{\sum_{r=1}^{R} d_{r,s,t} * x_{r,s,j,t}}{n_{s,t}} \right]$
Domain total demand (domain population known):	$\hat{\tau}(d_{j,t}) = \sum_{s=1}^{S} N_{s,j} * W_s \left[\frac{\sum_{r=1}^{R} d_{r,s,t} * x_{r,s,j,t}}{n_{s,j,t}} \right]$
Domain standard error (domain population unknown):	$se_{j,t} = \sqrt{\sum_{s=1}^{S} (N_s * \mathrm{W}_s)^2 * \left(1 - \frac{n_{s,t}}{N_s}\right) * \left[\frac{\sum_{r=1}^{R} d_{r,s,t}^2 * x_{r,s,j,t} - \frac{\left(\sum_{r=1}^{R} d_{r,s,t} * x_{r,s,j,t}\right)^2}{n_{s,t}}}{n_{s,t}(n_{s,t} - 1)} \right]}$
Domain standard error (domain population known):	$se_{j,t} = \sqrt{\sum_{s=1}^{S} (N_{sj} * \mathrm{W}_s)^{2} * \left(1 - \frac{n_{s,j,t}}{N_{sj}}\right) * \left[\frac{\sum_{r=1}^{R} d_{r,s,t}^2 * x_{r,s,j,t} - \frac{\left(\sum_{r=1}^{R} d_{r,s,t} * x_{r,s,j,t}\right)^2}{n_{s,j,t}}}{n_{s,j,t}(n_{s,j,t} - 1)} \right]}$

STATISTIC	FORMULA
Degrees of freedom:	$df_t = \dfrac{[se_{j,t}^2 \ (\bar{d}_t)]^2}{\sum_{1}^{S} [W_s^2 * se_{j,t}^2 \ (\bar{d}_{s,t})]^2 / (n_{s,t} - 1)}$
Relative accuracy:	$A_t = se(\ddot{\tau}_{r,j}) / \ddot{\tau}_{r,j} * t_{a/2,df}$

Average Day Statistics

Average day statistics are computed from a sample across a set of customers and across a set of days. Since samples from the same customer on separate days are not completely independent, Oracle Utilities Load Analysis cannot rigorously compute standard error, degrees of freedom or relative accuracy statistics. Instead Oracle Utilities Load Analysis reports a Relative Error measure using the standard error equation, where the sample size is the total number of observations across customers and days, and the domain size is the total number of observations across customers and days for those customers in the domain. This Relative Error cannot be interpreted as a standard error, because it would overstate the accuracy of the estimates.

Appendix I

Domains Analysis Ratio Equations

This appendix documents the domains analysis ratio calculations used in Oracle Utilities Load Analysis. This material assumes a basic understanding of statistics, load research calculations, and Oracle Utilities Load Analysis's operation.

H.1 Non-Stratified Domains Analysis Ratio Equations

Let:

j = index for each domain, j = 1,2, ..., J

r = index for each customer, r = 1,2, ..., R

t = index for each time, t = 1,2, ..., T

N = population size

E_j = total billed energy for domain j over the analysis period

E = total billed energy for domain j over the analysis period

$d_{r,j,t}$ = r-th customer's demand (KW) in domain j for time interval t

$e_{r,j,t}$ = r-th customer's total energy (KWH) in domain j for time interval t

$e_{r,t}$ = r-th customer's total energy (KWH) for time interval t

$c_{r,t}$ = r-th customer's status code (hexadecimal) for time interval t

C = Worst acceptable status code (hexadecimal)

a = 1 - level of significance used in relative accuracy calculation

$t_{a/2}$ = student's t-variate

Define:

$$x_{r,j,t} = \begin{cases} 1 & \text{if } C_{r,t} < \, = C \text{ and customer is in domain;} \\ 0 & \text{otherwise} \end{cases}$$

$$m_{t,p} = \begin{cases} 1 & \text{if interval is in Time-of-Use Period} \\ 0 & \text{otherwise}_{\text{t}} \end{cases}$$

$$f_{r,p} = \left(\frac{\sum_{t \in p} m_{t,p}}{\sum_{t \in p} x_{r,t}} \right) \quad (\textit{energy} \text{ proration factor for customer r for Time-of-Use period p})$$

STATISTIC	FORMULA
Sample size:	$n_t = \sum_{r=1}^{R} X_{r,t}$
Domain size:	$n_{j,t} = \sum_{r=1}^{R} X_{r,j,t}$
Domain mean demand:	$\bar{d}_{j,t} = \sum_{r=1}^{R} \frac{d_{r,t} * x_{r,j,t}}{n_t}$
Individual customer total energy:	$e_r = \sum_{p=1}^{P} \sum_{t=1}^{T} [d_{r,t} * m_{t,p} * x_{r,t}] * (f_{r,p})$
Domain mean energy:	$\bar{e}_{j,t} = \sum_{r=1}^{R} \frac{e_{r,t} * x_{r,j,t}}{n_t}$
Sample mean energy:	$\bar{e}_t = \sum_{r=1}^{R} \frac{e_{r,t} * x_{r,t}}{n_t}$
Ratio (Domain total billed energy unknown):	$R_{1(t)} = \frac{\bar{d}_{j,t}}{e_t}$
Ratio (Domain total billed energy known):	$R_{2(t)} = \frac{\bar{d}_{j,t}}{e_{j,t}}$
Standard deviation of domain demands:	$s(d_{j,t}) = \sqrt{\left[\sum_{r=1}^{R} \frac{(d_{r,t} * x_{r,j,t} - \bar{d}_{j,t})^2}{n_t - 1} \right]}$
Variance of domain demands:	$V(d_{j,t}) = [s(d_{j,t})]^2$
Standard deviation of domain energies:	$s(e_{j,t}) = \sqrt{\left[\sum_{r=1}^{R} \frac{(e_{r,t} * x_{r,j,t} - \bar{e}_{j,t})^2}{n_t - 1} \right]}$
Variance of domain energy:	$V(e_{j,t}) = [s(e_{j,t})]^2$
Standard deviation of sample energies:	$s(e_t) = \sqrt{\left[\sum_{r=1}^{R} \frac{(e_{r,t} * x_{r,t} - \bar{e}_t)^2}{n_t - 1} \right]}$

STATISTIC	FORMULA
Variance of sample energy:	$V(e_t) = [s(e_t)]^2$
Domain total demand (KW) (Domain total billed energy unknown):	$\hat{\tau}_{j,t} = E^*R_{1(t)}$
Domain total demand (KW) (Domain total billed energy known):	$\hat{\tau}_{j,t} = E_j^*R_{2(t)}$
Covariance between domain energy and demand (Domain total billed energy unknown):	$C_t = \sum_{r=1}^{R} \frac{(d_{r,t}^*x_{r,j,t} - \bar{d}_{j,t})^*(e_{r,t}^*x_{r,t} - \bar{e}_{t}}{n_t - 1}$
Covariance between domain energy and demand (Domain total billed energy known):	$C_{jt} = \sum_{r=1}^{R} \frac{(d_{r,t}^*x_{r,j,t} - \bar{d}_{j,t})^*(e_{r,t}^*x_{r,j,t} - \bar{e}_{j,t}}{n_t - 1}$
Q term for standard error of domain total calculation (Domain total billed energy unknown):	$Q_t = V(d_{j,t}) + R^2_{1(t)}{}^*V(e_t) - 2^*R_{1(t)}{}^*C_t$
Q term for standard error of domain total calculation (Domain total billed energy known):	$Q_t = V(d_{j,t}) + R^2_{2(t)}{}^*V(e_{j,t}) - 2^*R_{2(t)}{}^*C_{j,t}$
Variance of the domain total demand (KW):	$V(\hat{\tau}_{j,t}) = \left[\frac{N^2\left(1 - \frac{n_t}{N}\right)}{n_t}\right]^*Q_t$
Standard error of the domain total demand (KW):	$s(\hat{\tau}_{j,t}) = \sqrt{[V(\tau_{j,t})]}$
Relative accuracy:	$A_t = \frac{s(\hat{\tau}_{j,t})^*t_{a/2,df(t)}}{\hat{\tau}_{j,t}}$
Degrees of freedom:	$df_t = n_t - 1$

Required Conditions for the Correct Application of Domains Ratio Estimation

Let:

$CV(\bar{d}_{j,t})$ = Coefficient of variation for domain mean demand;

$CV(\bar{e}_{j,t})$ = Coefficient of variation for domain mean energy;

$CV(\bar{e}_{t})$ = Coefficient of variation for sample energy (use when domain total billed energy unknown);

n_t = Sample size for interval of time t;

Conditions:

(1) $$\mathrm{CV}(\bar{d}_{j,t}) = \sqrt{\left[\frac{(1-n_t/N)*V(\bar{d}_{j,t})}{(\bar{d}_{j,t})}\right]} \le 0.2$$

(2) $$\mathrm{CV}(\bar{e}_{j,t}) = \sqrt{\left[\frac{(1-n_t/N)*V(\bar{e}_{j,t})}{(\bar{e}_{j,t})}\right]} \le 0.2$$

or

$$\mathrm{CV}(\bar{e}_{t}) = \sqrt{\left[\frac{(1-n_t/N)*V(\bar{e}_{t})}{(\bar{e}_{t})}\right]} \le 0.2$$

3) $n_t \ge 30$ (*for* all intervals t in the analysis period)

H.2 Combined (Stratified) Domains Analysis Ratio Equations

Let:

j = Index for each domain, $j = 1,2, ..., J$;

r = Index for each customer, $r = 1,2, ..., R$;

s = Index for each stratum within the sample, $s = 1,2, ..., S$;

t = Index for each time, $t = 1, 2, ..., T$;

N = Population size;

N_s = Strata population;

E_j = Total billed energy for domain j over the analysis period;

E = Total billed energy for the population over the analysis period;

$d_{r,j,s,t}$ = Demand (KW) for the r-th customer in domain j, stratum s for time interval t;

$e_{r,j,s,t}$ = Total energy (KWH) for the r-th customer in domain j, stratum s for time interval t;

$e_{r,s,t}$ = Total energy (KWH) for the r-th customer in stratum s for time interval t;

$c_{r,s,t}$ = r-th customer’s status code (hexadecimal) in stratum s for time interval t

C = Worst acceptable status code (hexadecimal);

a = 1 - level of significance used in relative accuracy calculation;

$Z_{a/2}$ = Normal variate;

Define:

$$x_{r,j,s,t} = \begin{cases} 1 & \text{if } C_{r,s,t} <= C \text{ and customer is in domain;} \\ 0 & \text{otherwise} \end{cases}$$

$$m_{t,p} = \begin{cases} 1 & \text{if interval},_{t} \text{is in Time-of-Use Period p} \\ 0 & \text{otherwise} \end{cases}$$

$$f_{r,p} = \frac{\sum_{t \in p} m_{t,p}}{\sum_{t \in p} x_{r,s,t}} \quad (\mathit{energy} \text{ proration factor for customer r for Time-of-Use period p})$$

weighting factor for stratum s

$$W_s = \begin{cases} W_s & \text{if externally supplied weighting factor} \\ N_s / N \end{cases}$$

STATISTIC	**FORMULA**
Sample (Strata) size;	$n_{s,t} = \sum_{r=1}^{R} X_{r,s,t}$
Sample size:	$n_t = \sum_{s=1}^{S} n_{s,t}$
Domain (Strata) size:	$n_{s,j,t} = \sum_{r=1}^{R} X_{r,s,j,t}$
Domain size:	$n_{j,t} = \sum_{s=1}^{S} n_{s,j,t}$
Domain mean demand:	$\bar{d}_{j,s,t} = \sum_{r=1}^{R} \frac{d_{r,j,s,t} * x_{r,j,s,t}}{n_{s,t}}$
Individual customer total energy:	$e_{r,s} = \sum_{p=1}^{P} \sum_{t=1}^{T} [d_{r,s,t} * m_{t,p} * x_{r,s,t}] * (f_{r,p})$
Domain mean energy:	$\bar{e}_{s,j,t} = \sum_{r=1}^{R} \frac{e_{r,s,j} * x_{r,s,j,t}}{n_{s,t}}$
Sample mean energy:	$\bar{e}_{s,t} = \sum_{r=1}^{R} \frac{e_{r,s} * x_{r,s,t}}{n_{s,t}}$
Combined ratio (Domain total billed energy unknown):	$R_{1(t)} = \left[\frac{\sum_{s=1}^{S} W_s * \bar{d}_{s,j,t}}{\sum_{s=1}^{S} W_s * \bar{e}_{s,t}} = \frac{\bar{d}_{j,t}}{\overline{\bar{e}_t}} \right]$

STATISTIC	**FORMULA**
Combined ratio (Domain total billed energy known):	$R_{2(t)} = \left[\frac{\sum_{s=1}^{S} \frac{W_s * \bar{d}_{s,j,t}}{\bar{d}_{j,t}}}{\sum_{s=1}^{S} W_s * \bar{e}_{s,t} \overset{=}{} \overline{\bar{e}_{j,t}}} \right]$
Standard deviation of domain demands:	$s(d_{s,j,t}) = \sqrt{\left[\sum_{r=1}^{R} \frac{(d_{r,s,t} * x_{r,s,j,t} - \bar{d}_{s,j,t})^2}{n_{s,t} - 1} \right]}$
Variance of domain demands:	$V(d_{s,j,t}) = [s(d_{s,j,t})]^2$
Standard deviation of domain energies:	$s(e_{s,j,t}) = \sqrt{\left[\sum_{r=1}^{R} \frac{(e_{r,s,t} * x_{r,s,j,t} - \bar{e}_{s,j,t})^2}{n_{s,t} - 1} \right]}$
Variance of domain energy:	$V(e_{s,j,t}) = [s(e_{s,j,t})]^2$
Standard deviation of sample energies:	$s(e_{s,t}) = \sqrt{\left[\sum_{r=1}^{R} \frac{(e_{r,s,t} * x_{r,s,t} - \bar{e}_{s,t})^2}{n_{s,t} - 1} \right]}$
Variance of sample energy:	$V(e_{s,t}) = [s(e_{s,t})]^2$
Domain total demand (KW) (Domain total billed energy unknown):	$\hat{\tau}_{j,t} = E * R_{1(t)}$
Domain total demand (KW) (Domain total billed energy known):	$\hat{\tau}_{j,t} = E_j * R_{2(t)}$
Covariance between domain energy and demand (Domain total billed energy unknown):	$C_{s,t} = \sum_{r=1}^{R} \frac{(d_{r,s,t} * x_{r,s,j,t} - \bar{d}_{s,j,t}) * (e_{r,s,t} * x_{r,s,t} - \bar{e}_{s,t})}{n_{s,t} - 1}$
Covariance between domain energy and demand (Domain total billed energy known):	$C_{s,j,t} = \sum_{r=1}^{R} \frac{(d_{r,s,t} * x_{r,s,j,t} - \bar{d}_{s,j,t}) * (e_{r,s,t} * x_{r,s,j,t} - \bar{e}_{s,j,t})}{n_{s,t} - 1}$
Q term of strata for standard error of domain total calculation (Domain total billed energy unknown):	$Q_{s,t} = V(d_{s,j,t}) + R_{1(t)}^2 * V(e_{s,t}) - 2 * R_{1(t)} * C_{s,t}$
Q term of strata for standard error of domain total calculation (Domain total billed energy known):	$Q_{s,t} = V(d_{s,j,t}) + R_{2(t)}^2 * V(e_{s,j,t}) - 2 * R_{2(t)} * C_{s,j,t}$

STATISTIC	FORMULA
Variance of the domain total demand (KW):	$V(\hat{\tau}_{j,t})= \sum_{s=1}^{S} \left[\frac{(W_s * N)^2 (1 - \frac{n_{s,t}}{N_s})}{n_{s,t}} * \mathrm{Q}_{s,t} \right]$
Standard error of the domain total demand (KW):	$s(\hat{\tau}_{j,t})= \sqrt{[V(\tau_{j,t})]}$
Relative accuracy:	$A_t= \frac{s(\hat{\tau}_{j,t}) * Z_{a/2,df(t)}}{\hat{\tau}_{j,t}}$

Required Conditions for the Correct Application of Domains Ratio Estimation

Let:

$CV(\bar{d}_{j,t})$ = Coefficient of variation for domain mean demand;

$CV(\bar{e}_{j,t})$ = Coefficient of variation for domain mean energy;

$CV(\bar{e}_t)$ = Coefficient of variation for sample energy (use when domain total billed energy unknown);

$n_{s,t}$ = Sample size for interval of time t for strata s;

Conditions:

(1) $$\mathrm{CV}(\bar{e}_{j,t})= \sqrt{\left[\frac{(1 - n_t/N) * V(\bar{e}_{j,t})}{(\bar{e}_{j,t})}\right]} \le 0.2$$

or

$$\mathrm{CV}(\bar{e}_t)= \sqrt{\left[\frac{(1 - n_t/N) * V(\bar{e}_t)}{(\bar{e}_t)}\right]} \le 0.2$$

(2) $$\sum_{s=1}^{S} n_{s,t} \ge 30 \text{(for all intervals t in the analysis period)}$$

H.3 Average Day Statistics

Average day statistics are computed from a sample across a set of customers and across a set of days. Since samples from the same customer or separate days are not completely independent, Oracle Utilities Load Analysis cannot rigorously compute standard error, degrees of freedom or relative accuracy statistics. Instead Oracle Utilities Load Analysis reports a Relative Error Measure using the standard error equation, where the sample size is the total number of observations across customers and days. This Relative Error cannot be interpreted as a standard error because it would overstate the accuracy of the estimates.

Appendix J

Oracle Utilities Unit of Measure Codes

Intervals may be summed or averaged when aggregating depending on the unit of measure. The aggregation technique is noted on the table.

CODE	DESCRIPTION	AGGREGATION TECHNIQUE
01	kWh	Sum
02	kW	Average
03	kVARh	Sum
04	kVAH	Sum
05	Temperature (ºF)	Average
06	KQD	Average
07	V^2H (PTP)	Sum
08	kQh	Sum
09	kQh (45 degrees)	Sum
10	I^2H	Sum
11	Volts	Average
12	Amps	Average
13	Temperature (ºC)	Average
14	Dewpoint	Average
15	Amplitude	Average
16	Miscellaneous	Sum
17	Minute Run Time (MRT)	Sum
18	Wind Velocity (Cm/Sec)	Average
19	Fraction V2H (PTN)	Average
20	Percent	Average
21	Flow	Average

CODE	DESCRIPTION	AGGREGATION TECHNIQUE
22	kVAR	Average
23	kVA	Average
24	kVA Ratio	Average
25	Power Factor	Average
26	Hertz	Average
27	Feet	Average
28	Minutes	Sum
29	On/Off (Tap position)	Average
30	Inches	Average
31	Individual kWh	Sum
32	kWh r	Sum
33	Individual Totalized kVARh	Sum
34	kVARh r	Sum
35	Individual Totalized Temperature (°F)	Average
36	kVAh r	Sum
37	IND V^2H (Individual totalized V^2H)	Sum
38	IND kQh (Individual totalized kQh)	Sum
39	KQH r	Sum
40	Miscellaneous	Average
41	IND Volts (Individual totalized Volts)	Average
42	IND Amps (Individual totalized Amperes)	Average
43	IND Temperature (°C) (Individual totalized temperature, degrees Celsius)	Average
44	Mw	Sum
45	MVAR	Average
46	MVA	Average
47	IND MRT (Individual totalized MRT)	Sum
48	IND CMS (Individual totalized CMS)	Average
49	Run Hours	Sum
50	Equivalent Full Load Hours	Sum
51	KWH-OUT	Sum
52	KW-OUT	Average

CODE	DESCRIPTION	AGGREGATION TECHNIQUE
53	KVARH-OUT	Sum
54	KVAH-OUT	Sum
55	KQH-OUT	Sum
56	LEAD-KVARH	Sum
57	LEAD-KVARH-OUT	Sum
58	LAG-KVARH	Sum
59	LAG-KVARH-OUT	Sum
60	Gallons / Minute	Average
61	BTU	Sum
62	THERMS	Sum
63	Cubic Feet / Minute	Average
64	Cubic Feet / Second	Average
65	WM^2	Average
66	Relative Humidity	Average
67	MPH	Average
68	THI	Average
69	Gallons	Sum
70	Cubic Feet	Sum
71	Temperature Difference	Average
72	KVAR-OUT	Average
73	KVA-OUT	Average
74	Knots	Average
75	Degrees	Average
76	CCF (Hundred cubic feet)	Sum
77	CF / Hour	Average
78	Pounds / Square inch	Average
79	Dollars	Sum
80	DECATHERMS	Sum
81	Pounds	Sum
82	Pounds / Hour	Average
83	MPOUNDS	Sum
84	MPOUNDS / Hour	Average

CODE	DESCRIPTION	AGGREGATION TECHNIQUE
85	$/KWH	Average
86	$/MW	Average
87	$/MWH	Average
88	$/Hour	Average
89	Volt Hours	Sum
90	Individual Totalized Cubic Feet	Sum
91	Individual Totalized Btu	Sum
92	Pressure in MILLIBARS	Average
93	Visibility in Miles	Average
94	Cents per kWh	Average
99	Individual Totalized Gallons	Sum
100	MWH	Sum
102	Euros	Sum
103	Euros per MWH	Average
104	Euros MW	Average
105	GW	Average
106	TWH	Sum
107	Cubic Meters (M3)	Sum
108	Mega Joules per Cubic Meter (MJ/m3)	Average
109	Kilograms per Cubic Meter (Kg/m3)	Sum
110	Cubic Meters per Hour (M3/H)	Average

UOM Compatibility

When merging cuts with different units-of-measure, cuts with specific differing UOMs can be combined while others can't. For example, you can’t merge two cuts if the UOM of one cut is inches and the UOM of the other is dollars, because whichever UOM is assigned to the merged cut wouldn't apply to at least some of the data.

However, cuts with certain specific different UOMs can be combined. UOMs that can be combined are referred to as compatible UOMs, and are listed in the table below.

Compatible UOMs
01,31,32,51
02,52
03,33,34,53,56,57,58,59
04,36,54

Compatible UOMs
05,35
07,37
08,09,38,39,55
11,41
12,42
13,43
17,47
18,48
22,72
23,73
61,69
69,99
70,90

These units of measures may have their intervals divided by the IPH for display:

Demand-Type UOMs
02, 05, 06, 07, 10, 22, 23, 24, 52, 72, 73, 105, 110

Appendix K

Key Generator Variable Lists

This appendix documents all of the variables you can use to create Control files for the Key Generator programs.

Table 1: CLDB Key Generator Variable List

VARIABLE NAME	ATTRIBUTES	DESCRIPTION	RESTRICTIONS ON VALUES
ARCHIVE	FLAG	Determines whether or not cuts can be archived using X910	May be either “YES” for OK to archive, or “NO” for not OK to archive
CHANNEL	INTEGER(2)	Channel	May be 0 through 32767
CUSTID	CHAR(64)	Customer-id	
DST	CHAR(1)	DST Participant Flag	
EDITED	CHAR(1)	Indicates whether or not cut has been edited	May be either “Y” for edited or “N” for not edited
ESUM	REAL(8)	Energy Sum	Total of energy for all intervals in a cut
EXTVALID	CHAR(1)	Indicates whether or not cut has passed external validation tests	May be either “Y” for passed or “N” for not passed
INTVALID	CHAR(1)	Indicates whether or not cut has passed internal validation tests	May be either “Y” for passed or “N” for not passed
MERGE	CHAR(1)	Determines whether or not cuts can eventually be extracted from the ALDB to the ELDB for analysis	May be either “Y” for OK to extract or “N” for not OK to extract
MMULT	REAL(8)	Meter Multiplier	See note for PMULT
MOFFSET	REAL(8)	Meter Offset	See note for PMULT
MSGi	CHAR(80)	Used to test for validation messages, 1–10; i is the number of the message	Up to 80 characters
MSTART	REAL(8)	Meter-start-reading	See note for PMULT
MSTOP	REAL(8)	Meter-stop-reading	See note for PMULT
OLD KEY	CHAR(83)	Original key of a cut whose key has been changed using Load Data Editor	
ORIGIN	CHAR(1)	Origin	

Table 1: CLDB Key Generator Variable List (Continued)

VARIABLE NAME	ATTRIBUTES	DESCRIPTION	RESTRICTIONS ON VALUES
PMULT	REAL(8)	Pulse Multiplier (Documentation field only)	To obtain full precision of fields defined as “REAL”, it’s necessary to use a field-spec; e.g., pulse multiplier should be specified as PMULT 6.2
POFFSET	REAL	Pulse Offset (Documentation field only)	See note for PMULT
POP	REAL	Statistic Population	See note for PMULT
RECTYPE	CHAR(1)	Record Type	May be **‘ ‘** for active (either unedited or most recent version of edited cut), **‘**A**’** for inactive (old original version of an edited cut), or **‘**T**’** for edit trail
SPI	INTEGER	Seconds per interval	86400, 3600, 1800, 900, 300, 60
START	DATE/TIME	Cut start-date and -time	Format: MM/DD/YY-HH:MM:SS
STARTDAT	DATE	Cut start date	Format: MM/DD/YY
STOP	DATE/TIME	Cut stop-date and -time	Format: MM/DD/YY-HH:MM:SS
STOPDAT	DATE	Cut stop date	Format: MM/DD/YY
TOTINT	INTEGER	Total number of intervals	
TZSN	CHAR(32)	Time Zone Standard Name	

Table 2: ALDB Key Generator Variable List

VARIABLE NAME	ATTRIBUTES	DESCRIPTION	RESTRICTIONS ON VALUES
ARCHIVE	FLAG	Determines whether or not cuts can be archived using X910	May be either “YES” for OK to archive, or “NO” for not OK to archive
CHANNEL	CHAR(1)	Channel-number	May be 0 through 9
CUSTID	CHAR(64)	Customer-id	
EDITED	FLAG	Indicates whether or not cut has been edited	May be either “YES” for edited or “NO” for not edited
EXTVALID	FLAG	Indicates whether or not cut has passed external validation tests	May be either “YES” for passed or “NO” for not passed
INTVALID	FLAG	Indicates whether or not cut has passed internal validation tests	May be either “YES” for passed or “NO” for not passed
IPH	INTEGER	Intervals per hour	
MERGE	FLAG	Determines whether or not cuts can eventually be extracted from the ALDB to the ELDB for analysis	May be either “YES” for OK to extract or “NO” for not OK to extract
MMULT	REAL	Meter Multiplier	See note for PMULT

Table 2: ALDB Key Generator Variable List (Continued)

VARIABLE NAME	ATTRIBUTES	DESCRIPTION	RESTRICTIONS ON VALUES
MOFFSET	REAL	Meter Offset	See note for PMULT
MSG1	CHAR(80)	Used to test for validation messages, 1-10, i is the number of the message	Up to 80 characters
MSTART	REAL	Meter-start-reading	See note for PMULT
MSTOP	REAL	Meter-stop-reading	See note for PMULT
OLD KEY	CHAR(34)	Original key of a cut whose key has been changed using Load Data Editor	
PMULT	REAL	Pulse Multiplier	To obtain full precision of fields defined as “REAL,” it’s necessary to use a field-spec; e.g., pulse multiplier should be specified as PMULT 6.2
POFFSET	REAL	Pulse Offset	See note for PMULT
PSUM	INTEGER	Pulse Sum	
RECTYPE	CHAR(1)	Record Type	May be either ‘ ’ for active (either unedited or most recent version of edited cut, or ‘A’ for inactive (old original version of a cut) or ‘T’ for edit trail
SPI	INTEGER	Seconds Per Interval	3600, 1800, 900, 300, 60
START	DATE/TIME	Cut start-date and -time	Format: MM/DD/YY-HH:MM:SS
STARTDAT	DATE	Cut start date	Format: MM/DD/YY
STOP	DATE/TIME	Cut stop-date and -time	Format: MM/DD/YY-HH:MM:SS
STOPDAT	DATE	Cut stop date	Format: MM/DD/YY
TOTINT	INTEGER	Total number of intervals	
UOM	CHAR(2)	Unit of Measure code	Must be one of allowable codes (see *Appendix J: Oracle Utilities Unit of Measure Codes*)
?		Wildcard feature — Does the variable contain the test variable anywhere?	Example: CUSTID=* AGG Does the variable custid contain AGG?
*		Wildcard feature — Does the variable contain the test value starting in a specific column?	Example: custid=? ??? AGG Does the variable custid contain AGG starting in column 4?

Table 3: ELDB Key Generator Variable List

VARIABLE NAME	ATTRIBUTES	DESCRIPTION	RESTRICTIONS ON VALUES
ARCHIVE	FLAG	Determines whether or not cuts can be archived using X910	May be either “YES” for OK to archive, or “NO” for not OK to archive
CHANNEL	CHAR(1)	Channel-number	May be 0 through 9
CUSTID	CHAR(64)	Customer-id	
DESC	CHAR(80)	Descriptor	
EDITED	FLAG	Indicates whether or not cut has been edited	May be either “YES” for edited or “NO” for not edited
EXTVALID	FLAG	Indicates whether or not cut has passed external validation tests	May be either “YES” for passed or “NO” for not passed
INTVALID	FLAG	Indicates whether or not cut has passed internal validation tests	May be either “YES” for passed or “NO” for not passed
IPH	INTEGER	Intervals per hour	
MERGE	FLAG	Determines whether or not cuts can eventually be extracted from the ALDB to the ELDB for analysis	May be either “YES” for OK to extract or “NO” for not OK to extract
MMULT	REAL	Meter Multiplier	See note for PMULT
MOFFSET	REAL	Meter Offset	See note for PMULT
MSG1	CHAR(80)	Used to test for validation messages, 1-10, i is the number of the message	Up to 80 characters
MSTART	REAL	Meter-start-reading	See note for PMULT
MSTOP	REAL	Meter-stop-reading	See note for PMULT
OLD KEY	CHAR(34)	Original key of a cut whose key has been changed using Load Data Editor	
PMULT	REAL	Pulse Multiplier	To obtain full precision of fields defined as “REAL,” it’s necessary to use a field-spec; e.g., pulse multiplier should be specified as PMULT 6.2
POFFSET	REAL	Pulse Offset	See note for PMULT
PSUM	INTEGER	Pulse Sum	
RECTYPE	CHAR(1)	Record Type	May be either ‘ ’ for active (either unedited or most recent version of edited cut, or ‘A’ for inactive (old original version of a cut) or ‘T’ for edit trail
SPI	INTEGER	Seconds Per Interval	3600, 1800, 900, 300, 60
START	DATE/TIME	Cut start-date and -time	Format: MM/DD/YY-HH:MM:SS
STARTDAT	DATE	Cut start date	Format: MM/DD/YY
STOP	DATE/TIME	Cut stop-date and -time	Format: MM/DD/YY-HH:MM:SS

Table 3: ELDB Key Generator Variable List (Continued)

VARIABLE NAME	ATTRIBUTES	DESCRIPTION	RESTRICTIONS ON VALUES
STOPDAT	DATE	Cut stop date	Format: MM/DD/YY
TOTINT	INTEGER	Total number of intervals	
UOM	CHAR(2)	Unit of Measure code	Must be one of allowable codes (see *Appendix J: Oracle Utilities Unit of Measure Codes*)
?		Wildcard feature — Does the variable contain the test variable anywhere?	Example: CUSTID=* AGG Does the variable custid contain AGG?
*		Wildcard feature — Does the variable contain the test value starting in a specific column?	Example: custid=? ??? AGG Does the variable custid contain AGG starting in column 4?

Table 4: SLDB Key Generator Variable List

VARIABLE NAME	ATTRIBUTES	DESCRIPTION	RESTRICTIONS ON VALUES
ARCHIVE	FLAG	Determines whether or not cuts can be archived using X910	May be either “YES” for OK to archive, or “NO” for not OK to archive
CHANNEL	CHAR(1)	Channel-number	May be 0 through 9
CUSTID	CHAR(64)	Customer-id	
DESC	CHAR(80)	Descriptor	
EDITED	FLAG	Indicates whether or not cut has been edited	May be either “YES” for edited or “NO” for not edited
EXTVALID	FLAG	Indicates whether or not cut has passed external validation tests	May be either “YES” for passed or “NO” for not passed
INTVALID	FLAG	Indicates whether or not cut has passed internal validation tests	May be either “YES” for passed or “NO” for not passed
IPH	INTEGER	Intervals per hour	
MERGE	FLAG	Determines whether or not cuts can eventually be extracted from the ALDB to the ELDB for analysis	May be either “YES” for OK to extract or “NO” for not OK to extract
MMULT	REAL	Meter Multiplier	See note for PMULT
MOFFSET	REAL	Meter Offset	See note for PMULT
MSG1	CHAR(80)	Used to test for validation messages, 1-10, i is the number of the message	Up to 80 characters
MSTART	REAL	Meter-start-reading	See note for PMULT
MSTOP	REAL	Meter-stop-reading	See note for PMULT
OLD KEY	CHAR(34)	Original key of a cut whose key has been changed using Load Data Editor	
PMULT	REAL	Pulse Multiplier	To obtain full precision of fields defined as “REAL,” it’s necessary to use a field-spec; e.g., pulse multiplier should be specified as PMULT 6.2
POFFSET	REAL	Pulse Offset	See note for PMULT
PSUM	INTEGER	Pulse Sum	
RECTYPE	CHAR(1)	Record Type	May be either ‘ ’ for active (either unedited or most recent version of edited cut, or ‘A’ for inactive (old original version of a cut) or ‘T’ for edit trail
SPI	INTEGER	Seconds Per Interval	3600, 1800, 900, 300, 60
START	DATE/TIME	Cut start-date and -time	Format: MM/DD/YY-HH:MM:SS
STARTDAT	DATE	Cut start date	Format: MM/DD/YY
STOP	DATE/TIME	Cut stop-date and -time	Format: MM/DD/YY-HH:MM:SS

Table 4: SLDB Key Generator Variable List (Continued)

VARIABLE NAME	ATTRIBUTES	DESCRIPTION	RESTRICTIONS ON VALUES
STOPDAT	DATE	Cut stop date	Format: MM/DD/YY
TOTINT	INTEGER	Total number of intervals	
UOM	CHAR(2)	Unit of Measure code	Must be one of allowable codes (see *Appendix J: Oracle Utilities Unit of Measure Codes*)
?		Wildcard feature — Does the variable contain the test variable anywhere?	Example: CUSTID=* AGG Does the variable custid contain AGG?
*		Wildcard feature — Does the variable contain the test value starting in a specific column?	Example: custid=? ??? AGG Does the variable custid contain AGG starting in column 4?

Index