Exhibit No:	
Issues:	Depreciation Rates
Witness:	Dr. Ronald E. White
Type of Exhibit:	Direct Testimony
Sponsoring Party:	Aquila
Case No:	
Date to be Filed:	August 1, 2003

MISSOURI PUBLIC SERVICE COMMISSION

CASE NO. __________

DIRECT TESTIMONY

OF

DR. RONALD E. WHITE

ON BEHALF OF

AQUILA, INC.
d/b/a
AQUILA NETWORKS – MPS
and
AQUILA NETWORKS – L&P

Omaha, Nebraska
August, 2003

State of Florida)
) ss
County of Lee)

AFFIDAVIT OF RONALD E. WHITE

Ronald E. White, being first duly sworn, deposes and says that he is the witness who sponsors the accompanying testimony and schedules entitled "Direct Testimony of Ronald E. White"; that said testimony was prepared by him and/or under his direction and supervision; that if inquiries were made as to the facts in said testimony and schedules, he would respond as therein set forth; and that the aforesaid testimony and schedules are true and correct to the best of his knowledge, information, and belief.

Subscribed and sworn to before me this 23rd day of July, 2003.

Notary Public

My Commission expires:

OFFICIAL NOTARY SEAL
MARGARET E LANGE
NOTARY PUBLIC STATE OF FLORIDA
COMMISSION NO. DD060866
MY COMMISSION EXP. OCT. 19,2005

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DIRECT TESTIMONY OF DR. RONALD E. WHITE

Q. WOULD YOU PLEASE STATE YOUR NAME AND BUSINESS ADDRESS?

A. My name is Ronald E. White. My business address is 17595 S. Tamiami Trail, Suite 212, Fort Myers, Florida 33908.

Q. WHAT IS YOUR OCCUPATION?

A. I am an Executive Vice President and Senior Consultant of Foster Associates, Inc.

QUALIFICATIONS

Q. WOULD YOU BRIEFLY DESCRIBE YOUR EDUCATIONAL TRAINING AND PROFESSIONAL BACKGROUND?

A. I received a B.S. degree (1965) in Engineering Operations and an M.S. degree (1968) and Ph.D. (1977) in Engineering Valuation from Iowa State University. I have taught graduate and undergraduate courses in industrial engineering, engineering economics, and engineering valuation at Iowa State University and previously served on the faculty for Depreciation Programs for public utility Commissions, companies, and consultants, sponsored by Depreciation Programs, Inc., in cooperation with Western Michigan University. I also conduct courses in depreciation and public utility economics for clients of the firm.

I have prepared and presented a number of papers to professional organizations, committees, and conferences and have published several articles on matters relating to depreciation, valuation and economics. I am a past member of the Board of Directors of the Iowa State Regulatory Conference and an affiliate member of the joint American Gas Association (A.G.A.) – Edison Electric Institute (EEI) Depreciation Accounting Committee, where I previously served as chairman of a standing committee on capital recovery and its effect on corporate economics. I am also a member of the American Economic Association, the Financial Management Association, the Midwest Finance Association, the Electric Cooperatives Accounting Association (ECAA), and a founding member of the Society of Depreciation Professionals.

Q. WHAT IS YOUR PROFESSIONAL EXPERIENCE?

A. I joined the firm of Foster Associates in 1979, as a specialist in depreciation, the economics of capital investment decisions, and cost of capital studies for ratemaking applications. Before joining Foster Associates, I was employed by Northern States Power Company (1968-1979) in various assignments related to finance and treasury activities. As Manager of the Corporate Economics Department, I was responsible for book depreciation studies, studies involving staff assistance from the Corporate Economics Department in evaluating the economics of capital investment decisions, and the development and execution of innovative forms of project financing. As Assistant Treasurer at Northern States, I was responsible for bank relations, cash requirements planning, and short-term borrowings and investments.

Q. HAVE YOU PREVIOUSLY TESTIFIED BEFORE A REGULATORY BODY?

A. Yes. I have testified in numerous proceedings before administrative and judicial bodies in Alabama, Arizona, California, Colorado, Delaware, Hawaii, Idaho, Illinois, Iowa, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Montana, Nevada, New Hampshire, New Jersey, North Carolina, North Dakota, Ohio, Oregon, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Vermont, Virginia, Wisconsin, and the District of Columbia. I have also testified before the Federal Energy Regulatory Commission, the Federal Power Commission, the Alberta Energy Board, the Ontario Energy Board, and the Securities and Exchange Commission. I have sponsored position statements before the Federal Communication Commission and numerous local franchising authorities in matters relating to the regulation of telephone and cable television. A more detailed description of my professional qualifications is included in attached Schedule REW–1.

PURPOSE OF TESTIMONY

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS PROCEEDING?

A. Foster Associates was engaged by Aquila Networks ("Aquila" or "Company") to conduct depreciation studies for its gas properties operated by Aquila Networks—MPS and Aquila Networks—SJLP. The engagement also included a 2003 Depreciation Rate Study of Aquila Corporate Assets shared with other business units, including MPS and SJLP. The purpose of my testimony is to sponsor the studies conducted by Foster Associates for MPS, SJLP and Corporate Assets operations.

DEVELOPMENT OF DEPRECIATION RATES

Q. WOULD YOU PLEASE EXPLAIN WHY DEPRECIATION STUDIES ARE NEEDED FOR ACCOUNTING AND RATEMAKING PURPOSES?

A. The goal of depreciation accounting is to charge to operations a reasonable estimate of the cost of the service potential of an asset (or group of assets) consumed during an accounting interval. A number of depreciation systems have been developed to achieve this objective, most of which employ time as the apportionment base.

Implementation of a time-based (or age-life system) of depreciation accounting requires the estimation of several parameters or statistics related to a plant account. The average service life of a vintage, for example, is a statistic that will not be known with certainty until all units from the original placement have been retired from service. A vintage average service life, therefore, must be estimated initially and periodically revised as indications of the eventual average service life become more certain. Future net salvage rates and projection curves, which describe the expected distribution of retirements over time, are also estimated parameters of a depreciation system that are subject to future revisions.

Depreciation studies should be conducted periodically to assess the continuing reasonableness of parameters and accrual rates derived from prior estimates. The need for periodic depreciation studies is also a derivative of the ratemaking process which establishes prices for utility services based on costs. Absent regulation, deficient or excessive depreciation rates will produce no adverse consequence other than a systematic over or understatement of the accounting measurement of earnings. While a continuance of such practices may not comport with the goals of depreciation accounting, the achievement of capital recovery is not dependent upon either the amount or the timing of depreciation expense for an unregulated firm. In the case of a regulated utility, however, recovery of investor-supplied capital is dependent upon allowed revenues, which are in turn dependent upon approved levels of depreciation expense. Periodic reviews of depreciation rates are, therefore, essential to the achievement of timely capital recovery for a regulated utility.

It is also important to recognize that revenue associated with depreciation is a significant source of internally generated funds used to finance plant replacements and new capacity additions. It can be shown that given the same financing requirements and the same dividend payout ratio, an increase in internal cash generation will accelerate per-share growth in earnings, dividends, and book value over the business life of a firm. Financial theory provides that the marginal cost of external financing will be reduced by these enhanced measurements of financial performance. This is not to suggest that internal cash generation should be substituted for the goals of depreciation accounting. However, the potential for realizing a reduction in the marginal cost of external financing provides an added incentive for conducting periodic depreciation studies and adopting proper depreciation rates.

Q. WHAT ARE THE PRINCIPAL ACTIVITIES INVOLVED IN CONDUCTING A DEPRECIATION STUDY?

A. The first step in conducting a depreciation study is the collection of plant accounting data needed to conduct a statistical analysis of past retirement experience. Data are also collected to permit an analysis of the relationship between retirements and realized gross salvage and removal expense. The data collection phase should include a verification of the accuracy of the plant accounting records and a reconciliation of the assembled data to the official plant records of the company.

The next step in a depreciation study is the estimation of service life statistics from an analysis of past retirement experience. The term *life analysis* is used to describe the activities undertaken in this step to obtain a mathematical description of the forces of retirement acting upon a plant category. The mathematical expressions used to describe these forces are known as survival functions or survivor curves.

Life indications obtained from an analysis of past retirement experience are blended with expectations about the future to obtain an appropriate projection life curve. This step, called *life estimation*, is concerned with predicting the expected remaining life of property units still exposed to the forces of retirement. The amount of weight given to the analysis of historical data will depend upon the extent to which past retirement experience is considered descriptive of the future.

An estimate of the net salvage rate applicable to future retirements is usually obtained from an analysis of the gross salvage and removal expense realized in the past. An analysis of past experience (including an examination of trends over time) provides a baseline for estimating future salvage and cost of removal. Consideration, however, should be given to events that may cause deviations from the net salvage realized in the past. Among the factors which should be considered are the age of plant retirements; the portion of retirements that will be reused; changes in the method of removing plant; the type of plant to be retired in the future; inflation expectations; the shape of the projection life curve; and economic conditions that may warrant greater or lesser weight to be given to the net salvage observed in the past.

A comprehensive depreciation study will also include an analysis of the adequacy of the recorded depreciation reserve. The purpose of such an analysis is to compare the current balance in the recorded reserve with the balance required to achieve the goals and objectives of depreciation accounting if the amount and timing of future retirements and net salvage are realized exactly as predicted. The difference between the required (or theoretical) reserve and the recorded reserve provides a measurement of the expected excess or shortfall that will remain in the depreciation reserve if corrective action is not taken to extinguish the reserve imbalance.

Although reserve records are typically maintained by various account classifications, the total reserve for a company is the most important measure of the status of the company's depreciation practices and procedures. Differences between the theoretical reserve and the recorded reserve will arise as a normal occurrence when service lives, dispersion patterns and salvage estimates are adjusted in the course of depreciation reviews. Differences will also arise due to plant accounting activity such as transfers and adjustments, which require an identification of reserves at a different level from that maintained in the accounting system. It is appropriate, therefore, and consistent with group depreciation theory, to periodically redistribute recorded reserves among primary accounts based on the most recent estimates of retirement dispersion and salvage. A redistribution of the recorded reserve will provide an initial reserve balance for each primary account consistent with the estimates of retirement dispersion selected to describe mortality characteristics of the accounts and establish a baseline against which future comparisons can be made.

Finally, parameters estimated from service life and net salvage studies are integrated into an appropriate formulation of an accrual rate based upon a selected depreciation system. Three elements are needed to describe a depreciation system. These elements (*i.e.*, method, procedure and technique) can be visualized as three dimensions of a cube in which each face describes a variety of sub-elements that can be combined to form a system. A depreciation system is therefore formed by selecting a sub-element from each face such that the system contains one method, one procedure and one technique. The sub-elements commonly used in constructing a depreciation system are shown in Table 1.

METHODS	PROCEDURES	TECHNIQUES
Retirement	Total Company	Whole-Life
Compound-Interest	Broad Group	Remaining-Life
Sinking-Fund	Vintage Group	Probable-Life
Straight-Line	Equal-Life Group	
Declining Balance	Unit Summation	
Sum-of-Years'-Digits	Item	
Expensing		
Unit-of-Production		
Net Revenue		

TABLE 1. ELEMENTS OF A DEPRECIATION SYSTEM

2002 MPS DEPRECIATION RATE STUDY

Q. DID AQUILA PROVIDE FOSTER ASSOCIATES PLANT ACCOUNTING DATA FOR CONDUCTING THE 2002 MPS DEPRECIATION STUDY?

A. Yes, they did. The database used in the 2002 study was compiled from two sources. Detailed accounting transactions were extracted from these sources and assigned transaction codes which identify the nature of the accounting activity. Transaction codes for plant additions, for example, are used to distinguish normal additions from acquisitions, purchases, reimbursements and adjustments. Similar transaction codes are used to distinguish normal retirements from sales, reimbursements, abnormal retirements and adjustments. Transaction codes are also assigned to transfers, capital leases and other accounting activity which should be considered in a depreciation study.

The first data source was an electronic file historically provided to the Missouri Commission to conduct independent analyses. While the file included vintage years since inception through 1997, it did not provide a distinction between additions, transfers, and adjustments. The file, therefore, was recreated by the Company using a legacy system database to provide the appropriate distinctions. A translation program was then used by Foster Associates to create a database in a format compatible with the software used to conduct the depreciation study.

The second source of data was the current CPR system installed by Aquila in 1998. The database obtained from this system included activity year transactions over the period 1998-2001 and the age distribution of surviving plant at December 31, 2001. Age distributions at December 31, 2001 were used in conjunction with activity year transactions to reverse the transaction flow and generate an age distribution at December 31, 1997. The resulting age distributions were then compared to the age distributions generated by the Commission database. Differences were coded as vintage adjustments in 1997 to interconnect and provide continuity between the two databases. Care was taken in creating the Foster Associates database to ensure a proper mapping of the legacy system account structure to the current CPR account structure. No attempt, however, was made to reconcile the Foster Associates database to the historical Commission database because of the treatment of adjusting transactions in the Commission database.

The accuracy and completeness of the assembled data base was verified by Foster Associates for activity years 1998 through 2001 by comparing the beginning plant balance, additions, retirements, transfers and adjustments, and the ending plant balance derived for each activity year to the official plant records of the Company. Age distributions of surviving plant at December 31, 2001 were reconciled to the CPR.

Q. **DID FOSTER ASSOCIATES CONDUCT A STATISTICAL LIFE ANALYSIS FOR MPS GAS OPERATIONS?**

A. Yes, we did. As discussed in Schedule REW–2, all plant accounts were analyzed using a technique in which first, second and third degree polynomials were fitted to a set of observed retirement ratios. The resulting function can be expressed as a survivorship function, which is numerically integrated to obtain an estimate of the average service life. The smoothed survivorship function is then fitted by a weighted least-squares procedure to the Iowa-curve family to obtain a mathematical description or classification of the dispersion characteristics of the data. Service life indications derived from the statistical analyses were blended with informed judgment and expectations about the future to obtain an appropriate projection life curve for each plant category.

Q. **DID FOSTER ASSOCIATES CONDUCT A NET SALVAGE ANALYSIS FOR**

MPS GAS OPERATIONS?

A. Yes, we did. A traditional, historical analysis using a five-year moving average of the ratio of realized salvage and removal expense to the associated retirements was used in the study to a) estimate a realized net salvage rate; b) detect the emergence of historical trends; and c) establish a basis for estimating a future net salvage rate. Cost of removal and salvage opinions obtained from MPS operating personnel were blended with judgment and historical net salvage indications in developing estimates of the future.

The average net salvage rate for an account was estimated using direct dollar weighting of historical retirements with the historical net salvage rate, and future retirements (*i.e.*, surviving plant) with the estimated future net salvage rate.

Q. **DID FOSTER ASSOCIATES CONDUCT AN ANALYSIS OF THE RECORDED DEPRECIATION RESERVE FOR MPS GAS OPERATIONS?**

A. Yes, we did. Statement C (page 16) of Exhibit REW–2 provides a comparison of the computed and recorded reserves for MPS on December 31, 2001. The recorded reserve was $26,053,965 or 31.1 percent of the depreciable plant investment. The corresponding computed reserve is $31,660,494 or 37.8 percent of the depreciable plant investment. A proportionate amount of the measured reserve imbalance of $5,606,529 will be amortized over the composite weighted-average remaining life of each rate category.

Q. **IS FOSTER ASSOCIATES RECOMMENDING A REBALANCING OF DEPRECIATION RESERVES FOR MPS?**

A. Yes, we are. A redistribution of recorded reserves is appropriate for MPS.

Although recorded reserves have been maintained by primary account (and locations within primary accounts), these reserves were largely ignored in the development of the presently prescribed whole-life accrual rates. Present gas rates were established by negotiations and compromise in Formal Case No. GR-88-171 and GR-88-194 pursuant to a Stipulation and Agreement dated September 1, 1988. Reserve ratios were not considered in the settled rates.

This failure to address prior reserve imbalances produces an added dimension of instability in accrual rates beyond the variability attributable to the parameters estimated in the current study. A redistribution of the recorded reserve is necessary, therefore, to develop an initial reserve balance for each primary account consistent with the age distributions and estimates of retirement dispersion developed in this study.

A redistribution of the recorded reserve was achieved for MPS by multiplying the calculated reserve for each primary account within a function by the ratio of the function total recorded reserve to the function total calculated reserve. The sum of the redistributed reserves within a function is, therefore, equal to the function total recorded depreciation reserve before the redistribution.

Q. **WOULD YOU PLEASE DESCRIBE THE DEPRECIATION SYSTEM CURRENTLY APPROVED BY THE COMMISSION FOR MPS?**

A. MPS is presently using a depreciation system composed of the straight-line method, vintage group procedure, whole-life technique. The formulation of an account depreciation accrual rate using the straight-line method, vintage group procedure, whole-life technique is given by:

$$Accrual\ Rate = \frac{1.0 - Average\ Net\ Salvage\ Rate}{Average\ Life}.$$

Q. IS FOSTER ASSOCIATES RECOMMENDING A CHANGE IN THE DEPRECIATION SYSTEM FOR MPS?

A. Yes, we are. It is the opinion of Foster Associates that the objectives of depreciation accounting can be more nearly achieved using the vintage group procedure combined with the remaining life technique. The formulation of an account accrual rate using the straight-line method, vintage group procedure, remaining-life technique is given by:

$$Accrual\ Rate = \frac{1.0 - Reserve\ Ratio - Future\ Net\ Salvage\ Rate}{Remaining\ Life}.$$

Q. WHAT IS THE RELATIONSHIP BETWEEN A WHOLE-LIFE RATE AND A REMAINING-LIFE RATE?

A. The principal distinction between a whole-life rate and a remaining-life rate is the treatment of depreciation reserve imbalances caused largely by imprecise estimates of service life statistics and net salvage rates. A reserve imbalance is measured as the difference between a theoretical or computed reserve and the corresponding recorded reserve for a rate category. A remaining-life rate is the sum of two components: a) a whole-life rate; and b) an amortization of any reserve imbalance over the composite weighted average remaining life of a rate category. In other words, a remaining-life accrual rate is equivalent to

$$Accrual\ Rate = \frac{1.0 - Average\ Net\ Savage\ Rate}{Average\ Life} + \frac{Computed\ Reserve - Recorded\ Reserve}{Remaining\ Life}$$

where both the computed reserve and the recorded reserve are expressed as ratios to the plant in service.

Unlike the currently prescribed whole-life rates in which reserve imbalances are addressed by the presence of compensating deviations in the estimated average service life of each vintage, the remaining-life technique provides a systematic amortization of these imbalances over the composite weighted average remaining life of a rate category. A permanent excess or deficiency will be created in the depreciation reserve by a continued application of the whole-life technique if service life deviations are not exactly offsetting. The potential for a permanent reserve imbalance can be eliminated by an application of the remaining-life technique.

Q. WOULD YOU PLEASE SUMMARIZE THE DEPRECIATION RATES AND ACCRUALS FOSTER ASSOCIATES RECOMMENDED FOR MPS IN THE 2002 STUDY?

A. Table 2 provides a summary of the changes in annual rates and accruals for MPS resulting from adoption of the parameters and depreciation system recommended in the 2002 study.

	Accrual Rate			2002 Annualized Accrual		
Function	Present	Proposed	Difference	Present	Proposed	Difference
Transmission	1.71%	1.36%	-0.35%	$124,855	$99,584	($25,271)
Distribution	3.07%	3.61%	0.54%	2,280,006	2,681,404	401,398
General Plant	9.96%	5.66%	-4.30%	203,641	115,755	(87,886)
Total Utility	3.12%	3.46%	0.34%	$2,608,502	$2,896,743	$288,241

TABLE 2. 2002 MPS DEPRECIATION STUDY RATES AND ACCRUALS

Foster Associates recommended primary account depreciation rates equivalent to a composite rate of 3.46 percent. Depreciation expense is presently accrued at an equivalent composite rate of 3.12 percent. The recommended change in the composite depreciation rate is, therefore, an increase of 0.34 percentage points. A continued application of rates currently prescribed would provide annualized depreciation expense of $2,608,502 compared to an annualized expense of $2,896,743 using the rates developed in the 2002 study. The proposed 2002 expense increase is $288,241. Of this increase, $167,427 represents amortization of a $5,606,529 reserve imbalance. The remaining portion of the increase is attributable to changes in service life and net salvage parameters.

2002 SJLP DEPRECIATION RATE STUDY

Q. **DID AQUILA PROVIDE FOSTER ASSOCIATES PLANT ACCOUNTING DATA FOR CONDUCTING THE 2002 SJLP DEPRECIATION STUDY?**

A. Yes, they did. The database used in the 2002 study was compiled from two sources. Detailed accounting transactions were extracted from these sources and assigned transaction codes which identify the nature of the accounting activity. Transaction codes for plant additions, for example, are used to distinguish normal additions from acquisitions, purchases, reimbursements and adjustments. Similar transaction codes are used to distinguish normal retirements from sales, reimbursements, abnormal retirements and adjustments. Transaction codes are also assigned to transfers, capital leases and other accounting activity which should be considered in a depreciation study.

The first data source was an electronic file used by SJLP in conducting its 1998 depreciation rate study. The legacy data base was updated by SJLP to include activity years 1998 through 2000. The earliest activity year in the updated file was 1980. An electronic worksheet was used by Foster Associates to create a coded database in a format compatible with the software used to conduct the 2002 depreciation study.

The second source of data was the current CPR system installed by Aquila in 1998. The database obtained from this system included activity year transactions for calendar year 2001 and the age distribution of surviving plant at December 31, 2001. Plant transactions for 2001 were added to the legacy database to generate age distributions at December 31, 2001. The resulting age distributions were then compared to the age distributions extracted from the current CPR. Differences were coded as vintage adjustments in 2001 to interconnect and provide continuity between the two databases. Care was taken in creating the Foster Associates database to ensure a proper mapping of the legacy system account structure to the current CPR account structure.

The accuracy and completeness of the assembled data base was verified by Foster Associates for activity year 2001 by comparing additions, retirements, transfers and adjustments, and the ending plant balance derived for 2001 to the official plant records of the Company. The legacy database contains adjustments for depreciation study purposes which prevents reconciling the database to the official plant records for activity years prior to 2001.

Q. DID FOSTER ASSOCIATES CONDUCT A STATISTICAL LIFE ANALYSIS FOR SJLP GAS OPERATIONS?

A. Yes, we did. As discussed in Schedule REW–3, all plant accounts were analyzed using a technique in which first, second and third degree polynomials were fitted to a set of observed retirement ratios. The resulting function can be expressed as a survivorship function, which is numerically integrated to obtain an estimate of the average service life. The smoothed survivorship function is then fitted by a weighted least-squares procedure to the Iowa-curve family to obtain a mathematical description or classification of the dispersion characteristics of the data. Service life indications derived from the statistical analyses were blended with informed judgment and expectations about the future to obtain an appropriate projection life curve for each plant category.

Q. DID FOSTER ASSOCIATES CONDUCT A NET SALVAGE ANALYSIS FOR SJLP GAS OPERATIONS?

A. Yes, we did. A traditional, historical analysis using a five-year moving average of the ratio of realized salvage and removal expense to the associated retirements was used in the study to a) estimate a realized net salvage rate; b) detect the emergence of historical trends; and c) establish a basis for estimating a future net salvage rate. Cost of removal and salvage opinions obtained from SJLP operating personnel were blended with judgment and historical net salvage indications in developing estimates of the future.

The average net salvage rate for an account was estimated using direct dollar weighting of historical retirements with the historical net salvage rate, and future retirements (*i.e.*, surviving plant) with the estimated future net salvage rate.

Q. DID FOSTER ASSOCIATES CONDUCT AN ANALYSIS OF THE RECORDED DEPRECIATION RESERVE FOR SJLP GAS OPERATIONS?

A. Yes, we did. Statement C (page 16) of Exhibit REW–3 provides a comparison of the computed and recorded reserves for SJLP on December 31, 2001. The recorded reserve was $3,483,626 or 45.6 percent of the depreciable plant investment. The corresponding computed reserve is $4,168,382 or 54.6 percent of the depreciable plant investment. A proportionate amount of the measured reserve imbalance of $684,756 will be amortized over the composite weighted-average remaining life of each rate category.

Q. IS FOSTER ASSOCIATES RECOMMENDING A REBALANCING OF DEPRECIATION RESERVES FOR SJLP?

A. Yes, we are. A redistribution of recorded reserves is appropriate for SJLP. Although recorded reserves have been maintained by primary account (and locations within primary accounts), these reserves were largely ignored in the development of the presently prescribed whole-life accrual rates. Present gas rates were established pursuant to a Stipulation Agreement in Formal Case No. ER-99-246 dated August 17, 1999. Parameters and reserve ratios were not specified in the settled rates. This failure to address prior reserve imbalances produces an added dimension of instability in accrual rates beyond the variability attributable to the parameters estimated in the current study. A redistribution of the recorded reserve is necessary, therefore, to develop an initial reserve balance for each primary account consistent with the age distributions and estimates of retirement dispersion developed in this study. Reserves were also realigned in the 2002 study to reflect implementation of the vintage group procedure.

A redistribution of the recorded reserve was achieved for SJLP by multiplying the calculated reserve for each primary account within a function by the ratio of the function total recorded reserve to the function total calculated reserve. The sum of the redistributed reserves within a function is, therefore, equal to the function total recorded depreciation reserve before the redistribution.

Q. WOULD YOU PLEASE DESCRIBE THE DEPRECIATION SYSTEM CURRENTLY APPROVED BY THE COMMISSION FOR SJLP?

A. SJLP is presently using a depreciation system composed of the straight-line method, broad group procedure, whole-life technique. The level of asset grouping identified in the broad group procedure is the total plant in service from all vintages in an account. Each vintage is estimated to have the same average service life. The formulation of an account depreciation accrual rate using the straight-line method, broad group procedure, whole-life technique is given by:

$$Accrual\ Rate = \frac{1.0 - Average\ Net\ Salvage\ Rate}{Average\ Life}.$$

Q. IS FOSTER ASSOCIATES RECOMMENDING A CHANGE IN THE DEPRECIATION SYSTEM FOR SJLP?

A. Yes, we are. It is the opinion of Foster Associates that the objectives of depreciation accounting can be more nearly achieved using the vintage group procedure combined with the remaining life technique. Unlike the broad group procedure in which each vintage is estimated to have the same average service life, consideration is given to the realized life of each vintage when average service lives and remaining lives are derived using the vintage group procedure. The vintage group procedure distinguishes average service lives among vintages and composite life statistics are computed for each plant account. The formulation of an account accrual rate using the straight-line method, vintage group procedure, remaining-life technique is given by:

$$Accrual\ Rate = \frac{1.0 - Reserve\ Ratio - Future\ Net\ Salvage\ Rate}{Remaining\ Life}.$$

Q. WHAT IS THE RELATIONSHIP BETWEEN A WHOLE-LIFE RATE AND A REMAINING-LIFE RATE?

A. The principal distinction between a whole-life rate and a remaining-life rate is the treatment of depreciation reserve imbalances caused largely by imprecise estimates of service life statistics and net salvage rates. A reserve imbalance is measured as the difference between a theoretical or computed reserve and the corresponding recorded reserve for a rate category. A remaining-life rate is the sum of two components: a) a whole-life rate; and b) an amortization of any reserve imbalance over the composite weighted average remaining life of a rate category. In other words, a remaining-life accrual rate is equivalent to

$$AccrualRate = \frac{1.0 - AverageNet\ SavageRate}{AverageLife} + \frac{ComputedReserve - Recorded\ Reserve}{RemainingLife}$$

where both the computed reserve and the recorded reserve are expressed as ratios to the plant in service.

Unlike the currently prescribed whole-life rates in which reserve imbalances are addressed by the presence of compensating deviations in the estimated average service life of each vintage, the remaining-life technique provides a systematic amortization of these imbalances over the composite weighted average remaining life of a rate category. A permanent excess or deficiency will be created in the depreciation reserve by a continued application of the whole-life technique if service life deviations are not exactly offsetting. The potential for a permanent reserve imbalance can be eliminated by an application of the remaining-life technique.

Q. **WOULD YOU PLEASE SUMMARIZE THE DEPRECIATION RATES AND ACCRUALS FOSTER ASSOCIATES RECOMMENDED FOR SJLP IN THE 2002 STUDY?**

A. Table 3 provides a summary of the changes in annual rates and accruals for SJLP resulting from adoption of the parameters and depreciation system recommended in the 2002 study.

	Accrual Rate			2002 Annualized Accrual		
Function	Present	Proposed	Difference	Present	Proposed	Difference
Distribution	2.24%	3.55%	1.31%	$167,092	$265,617	$98,525
General Plant	2.60%	3.49%	0.89%	4,125	5,544	1,419
Total Utility	2.24%	3.55%	1.31%	$171,217	$271,161	$99,944

TABLE 3. 2002 SJLP DEPRECIATION STUDY RATES AND ACCRUALS

Foster Associates recommended primary account depreciation rates equivalent to a composite rate of 3.55 percent. Depreciation expense is presently accrued at an equivalent composite rate of 2.24 percent. The recommended change in the composite depreciation rate is, therefore, an increase of 1.31 percentage points. A continued application of rates currently prescribed would provide annualized depreciation expense of $171,217 compared to an annualized expense of $271,161 using the rates developed in the 2002 study. The proposed 2002 expense increase is $99,944. Of this increase, $27,623 represents amortization of a $684,756 reserve imbalance. The remaining portion of the increase is attributable to changes in service life and net salvage parameters.

2003 AQUILA CORPORATE ASSETS DEPRECIATION STUDY

Q. **DID AQUILA PROVIDE FOSTER ASSOCIATES PLANT ACCOUNTING DATA**

FOR CONDUCTING THE 2003 CORPORATE ASSETS DEPRECIATION STUDY?

A. Yes, they did. The database used in the 2003 study was compiled from the current CPR system installed by Aquila in 1998. The database was provided to Foster Associates in an electronic format containing activity year transactions over the period 1999 through September 30, 2002. Forecasted plant additions and depreciation accruals were provided over the period October 1 through December 31, 2002.

Transaction codes are used to describe the nature of the detailed accounting activity extracted from the CPR. Transaction codes for plant additions, for example, are used to distinguish normal additions from acquisitions, purchases, reimbursements and adjustments. Similar transaction codes are used to distinguish normal retirements from sales, reimbursements, abnormal retirements and adjustments. Transaction codes are also assigned to transfers, capital leases and other accounting activity which should be considered in a depreciation study.

The database was initially constructed to provide a reverse calculation of the historical arrangement over the period 1998–2002 for each account. Age distributions of plant exposed to retirement at the beginning of each activity year were obtained by adding (or subtracting) transaction amounts to the coded age distribution of surviving plant at the end of 2002. Plant additions for each activity year and age distributions of surviving plant at the beginning of 1999 derived from these transactions were subsequently coded and added to the database. The age distribution of surviving plant at the end of 2002 was then removed from the database. This conversion of the database from a reverse construction to a forward construction of the historical arrangement was made to facilitate maintaining the database for future depreciation studies. Future activity-year transactions (including plant additions) can now be appended to the database without removing or adjusting prior coded transactions.

The accuracy and completeness of the assembled data base was verified by Foster Associates for activity years 1999 through September 30, 2002 by comparing the beginning plant balance, additions, retirements, transfers and adjustments, and the ending plant balance derived for each activity year to the official plant records of the Company. Forecasted plant and reserve activity could not be reconciled to any official plant records of the Company.

Q. **DID FOSTER ASSOCIATES CONDUCT A STATISTICAL LIFE ANALYSIS FOR CORPORATE ASSETS OPERATIONS?**

A. Yes, we did. As discussed in Schedule REW–4, all plant accounts were analyzed using a technique in which first, second and third degree polynomials were fitted to a set of observed retirement ratios. The resulting function can be expressed in terms of a survivorship function, which is numerically integrated to obtain an estimate of the average service life. The smoothed survivorship function is then fitted by a weighted least-squares procedure to the Iowa-curve family to obtain a mathematical description or classification of the dispersion characteristics of the data. Service life indications derived from the statistical analyses were blended with informed judgment and expectations about the future to obtain an appropriate projection life curve for each plant category.

Without exception, service life indications were indeterminate from a statistical analysis of the available activity years. Much of the plant activity over the period 1999–2002 consisted of transfers, adjustments, and several large retirements associated with the formation of the Corporate Assets business unit. Service life indications were generally much shorter than either experience or the anticipated future use of the assets would suggest. Absent meaningful indications from the analysis of historical retirement activity, the service-life statistics recommended in this study were based largely on judgment and a consideration of the parameters approved for similar assets managed by other Aquila business units.

Q. DID FOSTER ASSOCIATES CONDUCT A NET SALVAGE ANALYSIS FOR CORPORATE ASSETS OPERATIONS?

A. Yes, we did. A traditional, historical analysis using a five-year moving average of the ratio of realized salvage and removal expense to the associated retirements was used in the study to a) estimate a realized net salvage rate; b) detect the emergence of historical trends; and c) establish a basis for estimating a future net salvage rate. Cost of removal and salvage opinions obtained from Aquila operating personnel were blended with judgment and historical net salvage indications in developing estimates of the future.

Account 390001 (Structures and Improvements) is the only account for which net salvage has been recorded. Salvage proceeds resulted from the sale of infrastructure improvements on developable land. Foster Associates was advised by Aquila that any future interim salvage from Corporate Assets will, most likely, be offset by removal expense. Accordingly, a future net salvage rate of zero percent is recommended for all Corporate Asset accounts.

The average net salvage rate for Account 390001was estimated using direct dollar weighting of historical retirements with the historical net salvage rate, and future retirements (*i.e.*, surviving plant) with the estimated future net salvage rate.

Q. DID FOSTER ASSOCIATES CONDUCT AN ANALYSIS OF THE RECORDED DEPRECIATION RESERVE FOR CORPORATE ASSETS OPERATIONS?

A. Yes, we did. Statement C (page 19) of Schedule REW–4 provides a comparison of the computed and recorded reserves forecasted for Corporate Assets – MPS on December 31, 2002. The recorded reserve is $2,051,206, or 3.9 percent of the depreciable plant investment. The corresponding computed reserve is $14,280,435 or 27.1 percent of the depreciable plant investment. A proportionate amount of the measured reserve imbalance of $12,229,229 will be amortized over the composite weighted-average remaining life of each rate category.

Statement C (page 26) of Schedule REW–4 provides a comparison of the computed and recorded reserves forecasted for Corporate Assets – SJLP on December 31, 2002. The recorded reserve is $697,985, or 4.1 percent of the depreciable plant investment. The corresponding computed reserve is $4,718,586 or 27.6 percent of the depreciable plant investment. A proportionate amount of the measured reserve imbalance of $4,020,601 will be amortized over the composite weighted-average remaining life of each rate category.

Q. IS FOSTER ASSOCIATES RECOMMENDING A REBALANCING OF DEPRECIATION RESERVES FOR CORPORATE ASSETS?

A. Yes, we are. A redistribution of recorded reserves is appropriate for Corporate

Assets. Although recorded reserves have been maintained by primary account, these reserves were largely ignored in the development of the currently used whole-life accrual rates. Depreciation rates currently used for Corporate Assets allocated to Missouri were approved by the Missouri Public Service Commission pursuant to a Stipulation and Agreement in consolidated Case Nos. ER-2001-672 and EC-2002-265 (Agreement dated February 5, 2002). The rates adopted for Corporate Assets were established by negotiations and compromise without specifying the projection curve and reserve ratios contemplated in the settled rates.

The failure to address prior reserve imbalances produces an added dimension of instability in accrual rates beyond the variability attributable to the parameters estimated in the current study. A redistribution of the recorded reserve is necessary, therefore, to develop an initial reserve balance for each primary account consistent with the age distributions and estimates of retirement dispersion developed in this study. Reserves should also be realigned in this study to reflect implementation of the vintage group procedure.[1]

A redistribution of the recorded reserve was achieved for Corporate Assets by multiplying the calculated reserve for each primary account within the general function by the ratio of the function total recorded reserve to the function total calculated reserve. The sum of the redistributed reserves within the general function is, therefore, equal to the function total recorded depreciation reserve before

[1]Depreciation reserves allocated to Missouri are adjusted for differences in the accrual rates prescribed in Missouri and those currently used for all other jurisdictions and non-regulated business units. The reserve adjustment is the cumulative difference in accruals resulting from the application of unique depreciation rates in Missouri. Reserve adjustments are shown on Statement C of Schedule REW–4.

redistribution.

Q. **WOULD YOU PLEASE DESCRIBE THE DEPRECIATION SYSTEM CURRENTLY APPROVED BY THE COMMISSION FOR CORPORATE ASSETS?**

A. Aquila is presently using a depreciation system composed of the straight-line method, broad group procedure, whole-life technique. The level of asset grouping identified in the broad group procedure is the total plant in service from all vintages in an account. Each vintage is estimated to have the same average service life. The formulation of an account depreciation accrual rate using the straight-line method, broad group procedure, whole-life technique is given by:

$$Accrual\ Rate = \frac{1.0 - Average\ Net\ Salvage\ Rate}{Average\ Life}.$$

Q. **IS FOSTER ASSOCIATES RECOMMENDING A CHANGE IN THE DEPRECIATION SYSTEM FOR CORPORATE ASSETS?**

A. Yes, we are. It is the opinion of Foster Associates that the objectives of depreciation accounting can be more nearly achieved using the vintage group procedure combined with the remaining life technique. Unlike the broad group procedure in which each vintage is estimated to have the same average service life, consideration is given to the realized life of each vintage when average service lives and remaining lives are derived using the vintage group procedure. The vintage group procedure distinguishes average service lives among vintages and composite life statistics are computed for each plant account. The formulation of an account accrual rate using the straight-line method, vintage group procedure, remaining-life technique is given by:

$$Accrual\ Rate = \frac{1.0 - Reserve\ Ratio - Future\ Net\ Salvage\ Rate}{Remaining\ Life}.$$

Q. WHAT IS THE RELATIONSHIP BETWEEN A WHOLE-LIFE RATE AND A REMAINING-LIFE RATE?

A. The principal distinction between a whole-life rate and a remaining-life rate is the treatment of depreciation reserve imbalances caused largely by imprecise estimates of service life statistics and net salvage rates. A reserve imbalance is measured as the difference between a theoretical or computed reserve and the corresponding recorded reserve for a rate category. A remaining-life rate is the sum of two components: a) a whole-life rate; and b) an amortization of any reserve imbalance over the composite weighted average remaining life of a rate category. In other words, a remaining-life accrual rate is equivalent to

$$Accrual Rate = \frac{1.0 - Average Net\ Savage Rate}{Average Life} + \frac{Computed Reserve - Recorded Reserve}{Remaining Life}$$

where both the computed reserve and the recorded reserve are expressed as ratios to the plant in service.

Unlike the currently prescribed whole-life rates in which reserve imbalances are addressed by the presence of compensating deviations in the estimated average service life of each vintage, the remaining-life technique provides a systematic amortization of these imbalances over the composite weighted average remaining life of a rate category. A permanent excess or deficiency will be created in the depreciation reserve by a continued application of the whole-life technique if service life deviations are not exactly offsetting. The potential for a permanent reserve imbalance can be eliminated by an application of the remaining-life technique.

Q. WOULD YOU PLEASE SUMMARIZE THE DEPRECIATION RATES AND ACCRUALS FOSTER ASSOCIATES RECOMMENDED FOR CORPORATE ASSETS IN THE 2003 STUDY?

A. Table 4 provides a summary of the changes in annual depreciation rates and accruals applicable to Corporate Assets devoted to MPS operations.

	Accrual Rate			2003 Annualized Accrual		
Function	Present	Proposed	Difference	Present	Proposed	Difference
General Plant	1.39%	11.86%	10.47%	$732,797	$6,256,676	$5,523,879

TABLE 4. 2003 CORPORATE ASSETS – MPS RATES AND ACCRUALS

The composite accrual rate recommended for MPS operations is 11.86 percent. The current equivalent rate is 1.39 percent. The recommended change in the composite rate is an increase of 10.47 percentage points.

A continued application of rates currently adopted for MPS would provide annualized depreciation expense of $732,797 compared to an annualized expense of $6,256,676 using the rates developed in this study. The proposed expense increase is $5,523,879. Of this increase, $1,985,795 represents amortization of a $12,229,229 reserve imbalance. The remaining portion of the increase is attributable to recommended changes in service life parameters.

Table 5 provides a summary of the changes in annual depreciation rates and accruals applicable to Corporate Assets devoted to SJLP operations.

	Accrual Rate			2003 Annualized Accrual		
Function	Present	Proposed	Difference	Present	Proposed	Difference
General Plant	1.41%	11.97%	10.56%	$241,203	$2,046,124	$1,804,921

TABLE 5. 2003 CORPORATE ASSETS – SJLP RATES AND ACCRUALS

The composite accrual rate recommended for SJLP operations is 11.97 percent.

The current equivalent rate is 1.41 percent. The recommended change in the composite rate is an increase of 10.56 percentage points.

A continued application of rates currently adopted for SJLP would provide annualized depreciation expense of $241,203 compared to an annualized expense of $2,046,124 using the rates developed in this study. The proposed expense increase is $1,804,921. Of this increase, $663,511 represents amortization of a $4,020,601 reserve imbalance. The remaining portion of the increase is attributable to recommended changes in service life parameters.

Q. **DOES THIS CONCLUDE YOUR DIRECT TESTIMONY?**

A. Yes, it does.

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Education

1961 - 1964 Valparaiso University
Major: Electrical Engineering

1965 Iowa State University
B.S., Engineering Operations

1968 Iowa State University
M.S., Engineering Valuation
Thesis: The Multivariate Normal Distribution and the Simulated Plant Record Method of Life Analysis

1977 Iowa State University
Ph.D., Engineering Valuation
Minor: Economics
Dissertation: A Comparative Analysis of Various Estimates of the Hazard Rate Associated With the Service Life of Industrial Property

Employment

1996 - Present Foster Associates, Inc.
Executive Vice President

1988 - 1996 Foster Associates, Inc.
Senior Vice President

1979 - 1988 Foster Associates, Inc.
Vice President

1978 - 1979 Northern States Power Company
Assistant Treasurer

1974 - 1978 Northern States Power Company
Manager, Corporate Economics

1972 - 1974 Northern States Power Company
Corporate Economist

1970 - 1972 Iowa State University
Graduate Student and Instructor

1968 - 1970 Northern States Power Company
Valuation Engineer

1965 - 1968 Iowa State University
Graduate Student and Teaching Assistant

Publications

A New Set of Generalized Survivor Tables, Journal of the Society of Depreciation Professionals, October, 1992.

The Theory and Practice of Depreciation Accounting Under Public Utility Regulation, Journal of the Society of Depreciation Professionals, December, 1989.

Standards for Depreciation Accounting Under Regulated Competition, paper presented at The Institute for Study of Regulation, Rate Symposium, February, 1985.

The Economics of Price-Level Depreciation, paper presented at the Iowa State University Regulatory Conference, May, 1981.

Depreciation and the Discount Rate for Capital Investment Decisions, paper presented at the National Communications Forum - National Electronics Conference, October 1979.

A Computerized Method for Generating a Life Table From the 'h-System' of Survival Functions, paper presented at the American Gas Association - Edison Electric Institute Depreciation Accounting Committee Meeting, December, 1975.

The Problem With AFDC is ..., paper presented at the Iowa State University Conference on Public Utility Valuation and the Rate Making Process, May, 1973.

The Simulated Plant-Record Method of Life Analysis, paper presented at the Missouri Public Service Commission Regulatory Information Systems Conference, May, 1971.

Simulated Plant-Record Survivor Analysis Program (User's Manual), special report published by Engineering Research Institute, Iowa State University, February, 1971.

A Test Procedure for the Simulated Plant-Record Method of Life Analysis, Journal of the American Statistical Association, September, 1970.

Modeling the Behavior of Property Records, paper presented at the Iowa State University Conference on Public Utility Valuation and the Rate Making Process, May, 1970.

A Technique for Simulating the Retirement Experience of Limited-Life Industrial Property, paper presented at the National Conference of Electric and Gas Utility Accountants, May, 1969.

How Dependable are Simulated Plant-Record Estimates?, paper presented at the Iowa State University Conference on Public Utility Valuation and the Rate Making Process, April, 1968.

Expert Opinion

Alabama Public Service Commission, Docket No. 18488, General Telephone Company of the Southeast; testimony concerning engineering economy study techniques.

Alabama Public Service Commission, Docket No. 20208, General Telephone Company of the South; testimony concerning the equal-life group procedure and remaining-life technique.

Alberta Energy and Utilities Board, Application No. 1250392, Aquila Networks Canada; rebuttal testimony supporting proposed depreciation rates.

Alberta Energy and Utilities Board, Case No. RE95081, Edmonton Power Inc.; rebuttal evidence concerning appropriate depreciation rates.

Alberta Energy and Utilities Board, 1999/2000 General Tariff Application, Edmonton Power Inc.; direct and rebuttal evidence concerning appropriate depreciation rates.

Arizona Corporation Commission, Docket No. T-01051B-97-0689, U S West Communications, Inc.; testimony concerning appropriate depreciation rates.

Arizona Corporation Commission, Docket No. G-1032A-02-0598, Citizens Communications Company; testimony supporting proposed depreciation rates.

Arizona State Board of Equalization, Docket No. 6302-07-2, Arizona Public Service Company; testimony concerning valuation and assessment of contributions in aid of construction.

California Public Utilities Commission, Case Nos. A.92-06-040, 92-06-042, GTE California Incorporated; rebuttal testimony supporting depreciation study techniques.

Public Utilities Commission of the State of Colorado, Application No. 36883-Reopened. U S WEST Communications; testimony concerning equal-life group procedure.

Delaware Public Service Commission, Docket No. 81-8, Diamond State Telephone Company; testimony concerning the amortization of inside wiring.

Delaware Public Service Commission, Docket No. 82-32, Diamond State Telephone Company; testimony concerning the equal-life group procedure and remaining-life technique.

Public Service Commission of the District of Columbia, Formal Case No. 842, District of Columbia Natural Gas; testimony concerning depreciation rates.

Public Service Commission of the District of Columbia, Formal Case No. 1016, Washington Gas Light Company - District of Columbia; testimony supporting proposed depreciation rates.

Federal Communications Commission, Prescription of Revised Depreciation Rates for AT&T Communications; statement concerning depreciation, regulation and competition.

Federal Communications Commission, Petition for Modification of FCC Depreciation Prescription Practices for AT&T; statement concerning alignment of depreciation expense used for financial reporting and regulatory purposes.

Federal Communications Commission, Docket No. 99-117, Bell Atlantic; affidavit concerning revenue requirement and capital recovery implications of omitted plant retirements.

Federal Energy Regulatory Commission, Docket No. ER95-267-000, New England Power Company; testimony supporting proposed depreciation rates.

Federal Energy Regulatory Commission, Docket No. RP89-248, Mississippi River Transmission Corporation; rebuttal testimony concerning appropriateness of net salvage component in depreciation rates.

Federal Energy Regulatory Commission, Docket No. ER91-565, New England Power Company; testimony supporting proposed depreciation rates.

Federal Energy Regulatory Commission, Docket No. ER78-291, Northern States Power Company; testimony concerning rate of return and general financial requirements.

Federal Energy Regulatory Commission, Docket Nos. RP80-97 and

RP81-54, Tennessee Gas Pipeline Company; testimony concerning offshore plant depreciation rates.

Federal Power Commission, Docket No. E-8252, Northern States Power Company; testimony concerning general financial requirements and measurements of financial performance.

Federal Power Commission, Docket No. E-9148, Northern States Power Company; testimony concerning general financial requirements and measurements of financial performance.

Federal Power Commission, Docket No. ER76-818, Northern States Power Company; testimony concerning rate of return and general financial requirements.

Federal Power Commission, Docket No. RP74-80, Northern Natural Gas Company; testimony concerning depreciation expense.

Public Utilities Commission of the State of Hawaii, Docket No. 00-0309, The Gas Company; testimony supporting proposed depreciation rates.

Public Utilities Commission of the State of Hawaii, Docket No. 94-0298, GTE Hawaiian Telephone Company Incorporated; testimony concerning the need for shortened service lives and disclosure of asset impairment losses.

Idaho Public Utilities Commission, Case No. U-1002-59, General Telephone Company of the Northwest, Inc.; testimony concerning the remaining-life technique and the equal-life group procedure.

Illinois Commerce Commission, Docket No. 94-0481, Citizens Utilities Company of Illinois; rebuttal testimony concerning applications of the Simulated Plant-Record method of life analysis.

Iowa State Commerce Commission, Docket No. RPU 82-47, North Central Public Service Company; testimony on depreciation rates.

Iowa State Commerce Commission, Docket No. RPU 84-34, General Telephone Company of the Midwest; testimony concerning the remaining-life technique and the equal-life group procedure.

Iowa State Utilities Board, Docket No. DPU-86-2, Northwestern Bell Telephone Company; testimony concerning capital recovery in competition.

Iowa State Utilities Board, Docket No. RPU-84-7, Northwestern Bell Telephone Company; testimony concerning the deduction of a reserve deficiency from the rate base.

Iowa State Utilities Board, Docket No. DPU-88-6, U S WEST Communications; testimony concerning depreciation subject to refund.

Iowa State Utilities Board, Docket No. RPU-90-9, Central Telephone Company of Iowa; testimony concerning depreciation rates.

Iowa State Utilities Board, Docket No. RPU-93-9, U S WEST Communications; testimony concerning principles of depreciation accounting and abandonment of FASB 71.

Iowa State Utilities Board, Docket No. DPU-96-1, U S WEST Communications; testimony concerning principles of depreciation accounting and abandonment of FASB 71.

Kentucky Public Service Commission, Case No. 97-224, Jackson Purchase Electric Cooperative Corporation; rebuttal testimony supporting proposed depreciation rates.

Maryland Public Service Commission, Case No. 8485, Baltimore Gas and Electric Company; testimony supporting proposed depreciation rates.

Maryland Public Service Commission, Case No. 7689, Washington Gas Light Company; testimony concerning life analysis and net salvage.

Maryland Public Service Commission, Case No. 8960, Washington Gas Light Company; testimony supporting proposed depreciation rates.

Massachusetts Department of Public Utilities, Case No. DPU 91-52, Massachusetts Electric Company; testimony supporting proposed depreciation rates which include a net salvage component.

Michigan Public Service Commission, Case No. U-13393, Aquila Networks – MGU; testimony supporting proposed depreciation rates.

Michigan Public Service Commission, Case No. U-12395, Michigan Gas Utilities; testimony supporting proposed depreciation rates including amortization accounting and redistribution of recorded reserves.

Michigan Public Service Commission, Case No. U-6587, General Telephone Company of Michigan; testimony concerning use of a theoretical depreciation reserve with the remaining-life technique.

Michigan Public Service Commission, Case No. U-7134, General Telephone Company of Michigan; testimony concerning the equal-life group depreciation procedure.

Minnesota District Court. In Re: Northern States Power Company v. Ronald G. Blank, *et. al.* File No. 394126; testimony concerning depreciation and engineering economics.

Minnesota Public Service Commission, Docket No. E-611, Northern States Power Company; testimony concerning rate of return and general financial requirements.

Minnesota Public Service Commission, Docket No. E-1086, Northern States Power Company; testimony concerning depreciation rates.

Minnesota Public Service Commission, Docket No. G-1015, Northern States Power Company; testimony concerning rate of return and general financial requirements.

Public Service Commission of the State of Missouri, Case No. ER-2001-672, Missouri Public Service, a division of Utilicorp United Inc.; surrebuttal testimony regarding computation of income tax expense.

Public Service Commission of the State of Missouri, Case No. TO-82-3, Southwestern Bell Telephone Company; rebuttal testimony concerning the remaining-life technique and the equal-life group procedure.

Public Service Commission of the State of Missouri, Case No. GO-97-79, Laclede Gas Company; rebuttal testimony concerning adequacy of database for conducting depreciation studies.

Public Service Commission of the State of Missouri, Case No. GR-99-315, Laclede Gas Company; rebuttal testimony concerning treatment of net salvage in development of depreciation rates.

Public Service Commission of the State of Montana, Docket No. 88.2.5, Mountain State Telephone and Telegraph Company; rebuttal testimony concerning the equal-life group procedure and amortization of reserve imbalances.

Montana Public Service Commission, Docket No. D95.9.128, The Montana Power Company; testimony supporting proposed depreciation rates.

Public Service Commission of Nevada, Docket No. 92-7002, Central Telephone Company-Nevada; testimony supporting proposed depreciation rates.

Public Service Commission of Nevada, Docket No. 91-5054, Central Telephone Company-Nevada; testimony supporting proposed depreciation rates.

New Hampshire Public Utilities Commission, Docket No. DR95-169, Granite State Electric Company; testimony supporting proposed net salvage rates.

New Jersey Board of Public Utilities, Docket No. GR 87060552, New Jersey Natural Gas Company; testimony concerning depreciation rates.

New Jersey Board of Regulatory Commissioners, Docket No. GR93040114J, New Jersey Natural Gas Company; testimony concerning depreciation rates.

North Carolina Utilities Commission, Docket No. E-7, SUB 487, Duke Power Company; rebuttal testimony ong proposed depreciation rates.

North Carolina Utilities Commission, Docket No. P-19, SUB 207, General Telephone Company of the South; rebuttal testimony concerning the equal-life group depreciation procedure.

North Dakota Public Service Commission, Case No. 8860, Northern States Power Company; testimony concerning general financial requirements.

North Dakota Public Service Commission, Case No. 9634, Northern States Power Company; testimony concerning rate of return and general financial requirements.

North Dakota Public Service Commission, Case No. 9666, Northern States Power Company; testimony concerning rate of return and general financial requirements.

North Dakota Public Service Commission, Case No. 9741, Northern States Power Company; testimony concerning rate of return and general financial requirements.

Ontario Energy Board, E.B.R.O. 385, Tecumseh Gas Storage Limited; testimony concerning depreciation rates.

Ontario Energy Board, E.B.R.O. 388, Union Gas Limited; testimony concerning depreciation rates.

Ontario Energy Board, E.B.R.O. 456, Union Gas Limited; testimony concerning depreciation rates.

Ontario Energy Board, E.B.R.O. 476-03, Union Gas Limited; testimony concerning depreciation rates.

Public Utilities Commission of Ohio, Case No. 81-383-TP-AIR, General

Telephone Company of Ohio; testimony in support of the remaining-life technique.

Public Utilities Commission of Ohio, Case No. 82-886-TP-AIR, General Telephone Company of Ohio; testimony concerning the remaining-life technique and the equal-life group procedure.

Public Utilities Commission of Ohio, Case No. 84-1026-TP-AIR, General Telephone Company of Ohio; testimony in support of the equal-life group procedure and the remaining-life technique.

Public Utilities Commission of Ohio, Case No. 81-1433, The Ohio Bell Telephone Company; testimony concerning the remaining-life technique and the equal-life group procedure.

Public Utilities Commission of Ohio, Case No. 83-300-TP-AIR, The Ohio Bell Telephone Company; testimony concerning straight-line age-life depreciation.

Public Utilities Commission of Ohio, Case No. 84-1435-TP-AIR, The Ohio Bell Telephone Company; testimony in support of test period depreciation expense.

Public Utilities Commission of Oregon, Docket No. UM 204, GTE of the Northwest; testimony concerning the theory and practice of depreciation accounting under public utility regulation.

Public Utilities Commission of Oregon, Docket No. UM 840, GTE Northwest Incorporated; rebuttal testimony concerning principles of capital recovery.

Pennsylvania Public Utility Commission, Docket No. R-80061235, The Bell Telephone Company of Pennsylvania; testimony concerning the proper depreciation reserve to be used with an original cost rate base.

Pennsylvania Public Utility Commission, Docket No. R-811512, General Telephone Company of Pennsylvania; testimony concerning the proper depreciation reserve to be used with an original cost rate base.

Pennsylvania Public Utility Commission, Docket No. R-811819, The Bell Telephone Company of Pennsylvania; testimony concerning the proper depreciation reserve to be used with an original cost rate base.

Pennsylvania Public Utility Commission, Docket No. R-822109, General Telephone Company of Pennsylvania; testimony in support of the remaining-life technique.

Pennsylvania Public Utility Commission, Docket No. R-850229, General Telephone Company of Pennsylvania; testimony in support of the remaining-life technique and the proper depreciation reserve to be used with an original cost rate base.

Pennsylvania Public Utility Commission, Docket No. C-860923, The Bell Telephone Company of Pennsylvania; testimony concerning capital recovery under competition.

Rhode Island Public Utilities Commission, Docket No. 2290, The Narragansett Electric Company; testimony supporting proposed net salvage rates and depreciation rates.

South Carolina Public Service Commission, Docket No. 91-216-E, Duke Power Company; testimony supporting proposed depreciation rates.

Public Utilities Commission of the State of South Dakota, Case No. F-3062, Northern States Power Company; testimony concerning general financial requirements and measurements of financial performance.

Public Utilities Commission of the State of South Dakota, Case No. F-3188, Northern States Power Company; testimony concerning rate of return and general financial requirements.

Securities and Exchange Commission, File No. 3-5749, Northern States Power Company; testimony concerning the financial and ratemaking implications of an affiliation with Lake Superior District Power Company.

Tennessee Public Service Commission, Docket No. 89-11041, United Inter-Mountain Telephone Company; testimony concerning depreciation principles and capital recovery under competition.

State of Vermont Public Service Board, Docket No. 6596, Citizens Communications Company – Vermont Electric Division, testimony supporting recommended depreciation rates.

Commonwealth of Virginia State Corporation Commission, Case No. PUE-2002-00364, Washington Gas Light Company; testimony supporting proposed depreciation rates.

Public Service Commission of Wisconsin, Docket No. 2180-DT-3, General Telephone Company of Wisconsin; testimony concerning the equal-life group depreciation procedure.

Other Consulting Activities

Moran Towing Corporation. In Re: Barge TEXAS-97 CIV. 2272 (ADS) and Tug HEIDE MORAN – 97 CIV. 1947 (ADS), United States District Court, Southern District of New York.

John Reigle, et al. v. Baltimore Gas & Electric Co., et al., Case No. C-2001-73230-CN, Circuit Court for Anne Arundel County, Maryland.

BellSouth Telecommunications, Inc. v. Citizens Utilities Company d/b/a/ Louisiana Gas Service Company, CA No. 95-2207, United States District Court, Eastern District of Louisiana.

Affidavit on behalf of Continental Cablevision, Inc. and its operating cable television systems regarding basic broadcast tier and equipment and installation cost-of-service rate justification.

Office of Chief Counsel, Internal Revenue Service. In Re: Kansas City Southern Railway Co., et. al. Docket Nos. 971-72, 974-72, and 4788-73.

Office of Chief Counsel, Internal Revenue Service. In Re: Northern Pacific Railway Co., Docket No. 4489-69.

United States Department of Justice. In Re: Burlington Northern Inc. v. United States, Ct. Cl. No. 30-72.

Faculty

Depreciation Programs for public utility commissions, companies, and consultants, sponsored by Depreciation Programs, Inc., in cooperation with Western Michigan University. (1980 - 1999)

United States Telephone Association (USTA), Depreciation Training Seminar, November 1999.

Depreciation Advocacy Workshop, a three-day team-training workshop on preparation, presentation, and defense of contested depreciation issues, sponsored by Gilbert Associates, Inc., October, 1979.

Corporate Economics Course, Employee Education Program, Northern States Power Company. (1968 - 1979)

Perspectives of Top Financial Executives, Course No. 5-300, University of Minnesota, September, 1978.

Depreciation Programs for public utility commissions, companies, and consultants, jointly sponsored by Western Michigan University and Michigan Technological University, 1973.

Professional Associations

Advisory Committee to the Institute for Study of Regulation, sponsored by the American University and The University of Missouri-Columbia.

American Economic Association.

American Gas Association - Edison Electric Institute Depreciation Accounting Committee.

Board of Directors, Iowa State Regulatory Conference.

Edison Electric Institute, Energy Analysis Division, Economic Advisory Committee, 1976-1980.

Financial Management Association.

The Institute of Electrical and Electronics Engineers, Inc., Power Engineering Society, Engineering and Planning Economics Working Group.

Midwest Finance Association.

Society of Depreciation Professionals (Founding Member and Chairman, Policy Committee

Moderator

Depreciation Open Forum, Iowa State University Regulatory Conference, May 1991.

The Quantification of Risk and Uncertainty in Engineering Economic Studies, Iowa State University Regulatory Conference, May 1989.

Plant Replacement Decisions with Added Revenue from New Service Offerings, Iowa State University Regulatory Conference, May 1988.

Economic Depreciation, Iowa State University Regulatory Conference, May 1987.

Opposing Views on the Use of Customer Discount Rates in Revenue Requirement Comparisons, Iowa State University Regulatory Conference, May 1986.

Cost of Capital Consequences of Depreciation Policy, Iowa State University Regulatory Conference, May 1985.

Concepts of Economic Depreciation, Iowa State University Regulatory Conference, May 1984.

Ratemaking Treatment of Large Capacity Additions, Iowa State University Regulatory Conference, May 1983.

The Economics of Excess Capacity, Iowa State University Regulatory Conference, May 1982.

New Developments in Engineering Economics, Iowa State University Regulatory Conference, May 1980.

Training in Engineering Economy, Iowa State University Regulatory

Conference, May 1979.

The Real Time Problem of Capital Recovery, Missouri Public Service Commission, Regulatory Information Systems Conference, September 1974.

Speaker

Finding the "D" in RCNLD (Valuation Applications of Depreciation), Society of Depreciation Professionals Annual Meeting, September 2001.

Capital Asset and Depreciation Accounting, City of Edmonton Value Engineering Workshop, April 2001.

A Valuation View of Economic Depreciation, Society of Depreciation Professionals Annual Meeting, October 1999.

Capital Recovery in a Changing Regulatory Environment, Pennsylvania Electric Association Financial-Accounting Conference, May 1999.

Depreciation Theory and Practice, Southern Natural Gas Company Accounting and Regulatory Seminar, March 1999.

Depreciation Theory Applied to Special Franchise Property, New York Office of Real Property Services, March 1999.

Capital Recovery in a Changing Regulatory Environment, PowerPlan Consultants Annual Client Forum, November 1998.

Economic Depreciation, AGA Accounting Services Committee and EEI Property Accounting and Valuation Committee, May 1998.

Discontinuation of Application of FASB Statement No. 71, Southern Natural Gas Company Accounting Seminar, April 1998.

Forecasting in Depreciation, Society of Depreciation Professionals Annual Meeting, September 1997.

Economic Depreciation In Response to Competitive Market Pricing, 1997 TELUS Depreciation Conference, June 1997.

Valuation of Special Franchise Property, City of New York, Department of Finance Valuation Seminar, March 1997.

Depreciation Implications of FAS Exposure Draft 158-B, 1996 TLG Decommissioning Conference, October 1996.

Why Economic Depreciation?, American Gas Association Depreciation Accounting Committee Meeting, August 1995.

The Theory of Economic Depreciation, Society of Depreciation Professionals Annual Meeting, November 1994.

Vintage Depreciation Issues, G & T Accounting and Finance Association Conference, June 1994.

Pricing and Depreciation Strategies for Segmented Markets (Regulated and Competitive), Iowa State Regulatory Conference, May 1990.

Principles and Practices of Depreciation Accounting, Canadian Electrical Association and Nova Scotia Power Electric Utility Regulatory Seminar, December 1989.

Principles and Practices of Depreciation Accounting, Duke Power Accounting Seminar, September 1989.

The Theory and Practice of Depreciation Accounting Under Public Utility

Regulation, GTE Capital Recovery Managers Conference, February 1989.

Valuation Methods for Regulated Utilities, GTE Capital Recovery Managers Conference, January 1988.

Depreciation Principles and Practices for REA Borrowers, NRECA 1985 National Accounting and Finance Conference, September 1985.

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Honors and Awards

The Society of Sigma Xi.

Professional Achievement Citation in Engineering, Iowa State University, 1993.

Schedule REW–2

2002 Depreciation Rate Study

Aquila Networks—MPS
(Gas Operations)

Prepared by
Foster Associates, Inc.

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EXECUTIVE SUMMARY

INTRODUCTION

This report presents the findings and recommendations developed in a 2002 Depreciation Rate Study for utility plant owned by Aquila Networks – MPS (Gas Operations). Work on the study, conducted by Foster Associates, Inc., commenced in October 2002 and progressed through mid-January 2003, at which time the project was completed.

Foster Associates, Inc. is a public utility economic consulting firm headquartered in Bethesda, Maryland offering economic research and consulting services on issues and problems arising from governmental regulation of business. The areas of specialization supported by our Fort Myers office include property life forecasting, technological forecasting, depreciation estimation, and valuation of industrial property.

Foster Associates has undertaken numerous depreciation engagements for both public and privately owned corporations including detailed statistical life studies, analyses of required net salvage rates, and the selection of depreciation systems that will most nearly achieve the goals of depreciation accounting under the constraints of either government regulation or competitive market pricing. Foster Associates is widely recognized for industry leadership in the development of depreciation systems, life analysis techniques and computer software for conducting depreciation and valuation studies.

Depreciation rates currently used by MPS were approved by the Missouri Public Service Commission (Commission) pursuant to a Stipulation and Agreement in Formal Case No. GR-88-171 and GR-88-194 dated September 1, 1988. Service life and net salvage statistics (*i.e.*, projection lives, projection curves, average service lives and net salvage rates) used to derive the settled depreciation rates were summarized in Staff Schedule 3-1. The approved depreciation rates became effective September 15, 1988.

The principal findings and recommendations of the 2002 MPS Depreciation Rate Study are summarized in the Statements section of this report. Statement A provides a comparative summary of present and proposed annual depreciation rates for each rate category. Statement B provides a comparison of present and proposed annual depreciation accruals. Statement C provides a comparison of the computed, recorded and redistributed depreciation reserves for each rate category. Statement D provides a summary of the components used to obtain a weighted-average net salvage rate for each plant account. Statement E provides a comparative summary of present and proposed parameters including projection life, projection curve, average service life, and average remaining life.

SCOPE OF STUDY

The principal activities undertaken in the current study included:

- Collection of plant and net salvage data;
- Reconciliation of data to the official records of the Company;
- Discussions with MPS plant accounting personnel;
- Estimation of projection lives and retirement dispersion patterns;
- Analysis of gross salvage and removal expense;
- Analysis and redistribution of recorded depreciation reserves; and
- Development of recommended accrual rates for each rate category.

DEPRECIATION SYSTEM

A depreciation rate is formed by combining the elements of a depreciation system. A depreciation system is composed of a method, a procedure and a technique. A depreciation method (*e.g.*, straight-line) describes the component of the system that determines the acceleration or deceleration of depreciation accruals in relation to either time or use. A depreciation procedure (*e.g.*, vintage group) identifies the level of grouping or sub-grouping of assets within a plant category. The level of grouping specifies the weighting used to obtain composite life statistics for an account. A depreciation technique (*e.g.*, remaining-life) describes the life statistic used in the system.

MPS is presently using a depreciation system composed of the straight-line method, vintage group procedure, whole-life technique for all plant categories. Depreciation rates proposed in this study are derived from a system composed of the straight-line method, vintage group procedure, whole-life technique with amortization of reserve imbalances over the estimated remaining life of each rate category. This formulation of the accrual rate is equivalent to a straight-line method, vintage group procedure, remaining-life technique.

The matching and expense recognition principles of accounting provide that the cost of an asset (or group of assets) should be allocated to operations over an estimate of the service life of the asset in proportion to the consumption of service potential. It is the opinion of Foster Associates that the objectives of depreciation accounting can be more nearly achieved through the use of a technique that provides cost apportionment over the estimated weighted average remaining life of a rate category.

The principal distinction between a whole-life rate and a remaining-life rate is the treatment of depreciation reserve imbalances caused largely by imprecise estimates of service life statistics and net salvage rates. A reserve imbalance is the difference between a theoretical or computed reserve and the corresponding recorded reserve for a rate category.

Unlike the currently prescribed whole-life technique in which reserve imbalances are addressed by the presence of compensating deviations in the estimated average service life of each vintage, the remaining-life technique provides a systematic amortization of these imbalances over the composite weighted average remaining life of a rate category. A permanent excess or deficiency will be created in the depreciation reserve by a continued application of the whole-life technique if service life deviations are not exactly offsetting. The potential for a permanent reserve imbalance can be eliminated by an application of the remaining-life technique.

PROPOSED DEPRECIATION RATES

Table 1 provides a summary of the changes in annual rates and accruals resulting from adoption of the parameters and depreciation system recommended in this study.

Rates and Accruals

Function	Accrual Rate			2002 Annualized Accrual		
	Present	Proposed	Difference	Present	Proposed	Difference
Transmission	1.71%	1.36%	-0.35%	$124,855	$99,584	$-25,271
Distribution	3.07%	3.61%	0.54%	2,280,006	2,681,404	401,398
General	9.96%	5.66%	-4.30%	203,641	115,755	-87,886
Total Utility	3.12%	3.46%	0.34%	$2,608,502	$2,896,743	$288,241

TABLE 1. PRESENT AND PROPOSED RATES AND ACCRUALS

Foster Associates is recommending primary account depreciation rates equivalent to a composite rate of 3.46 percent. Depreciation expense is presently accrued at an equivalent composite rate of 3.12 percent. The recommended change in the composite depreciation rate is, therefore, an increase of 0.34 percentage points.

A continued application of rates currently prescribed would provide annualized depreciation expense of $2,608,502 compared to an annualized expense of $2,896,743 using the rates developed in this study. The proposed expense increase is $288,241. Of this increase, $167,427 represents amortization of a $5,606,529 reserve imbalance. The remaining portion of the change in accruals is attributable to recommended changes in service life and net salvage parameters.

Of the 25 primary accounts included in the 2002 study, Foster Associates is recommending rate reductions for 14 accounts and rate increases 11accounts.

COMPANY PROFILE

GENERAL

Aquila began as Green Light and Power Company in 1917. In 1922 the name was changed to West Missouri Power Company and in 1927 was merged with Missouri Public Service Company, adopting the Missouri Public Service Company name. Over the ensuing years, the Company continued to grow and acquire other utilities. In 1985, the Company name was changed to UtiliCorp United to better describe the numerous areas of the country being served by the Company. In 2002, the Company changed its name to Aquila.

Based in Kansas City, Missouri, Aquila operates electric and natural gas distribution networks serving customers in seven states, Canada, the United Kingdom, and Australia. The Company also owns and operates power generation assets. At June 30, 2002, Aquila had total assets of $11.9 billion.

STUDY PROCEDURE

INTRODUCTION

The purpose of a depreciation study is to analyze the mortality characteristics, net salvage rates and adequacy of the depreciation accrual and recorded depreciation reserve for each rate category. This study provides the foundation and documentation for recommended changes in the depreciation accrual rates used by Aquila for its MPS gas operations. The proposed rates are subject to approval by the Missouri Public Service Commission.

SCOPE

The steps involved in conducting a depreciation study can be grouped into five major tasks:

- Data Collection;
- Life Analysis and Estimation;
- Net Salvage Analysis;
- Depreciation Reserve Analysis; and
- Development of Accrual Rates.

The scope of the 2002 study for MPS included a consideration of each of these tasks as described below.

DATA COLLECTION

The minimum database required to conduct a statistical life study consists of a history of vintage year additions and unaged activity year retirements, transfers and adjustments. These data must be appropriately adjusted for transfers, sales and other plant activity that would otherwise bias the measured service life of normal retirements. The age distribution of surviving plant for unaged data can be estimated by distributing the plant in service at the beginning of the study year to prior vintages in proportion to the theoretical amount surviving from a projection or survivor curve identified in the life study. The statistical methods of life analysis used to examine unaged plant data are known as *semi-actuarial techniques*.

A far more extensive database is required to apply the statistical methods of life analysis known as *actuarial techniques*. Plant data used in an actuarial life study most often include the age distribution of surviving plant at the beginning of the study year and the vintage year, activity year, and dollar amounts associated with normal retirements, reimbursed retirements, sales, abnormal retirements, transfers, corrections, and extraordinary adjustments over a series of prior activity years. An actuarial database may include the age distribution of surviving plant at the beginning of the earliest activity year, rather than at the beginning of the study year. Plant additions, however, must be included in a database containing an opening age distribution to derive aged survivors at the beginning of the study year. All activity year transactions with vintage year identification are coded and stored in a data file. The data are processed by a computer program and transaction summary reports are created in a format reconcilable to the Company's official plant records. The availability of such detailed information is dependent upon an accounting system that supports aged property records. The Continuing Property Record (CPR) system used by Aquila for MPS assets provides aged transactions for all plant accounts.

The database used in the 2002 study was compiled from two sources. Detailed accounting transactions were extracted from these sources and assigned transaction codes which identify the nature of the accounting activity. Transaction codes for plant additions, for example, are used to distinguish normal additions from acquisitions, purchases, reimbursements and adjustments. Similar transaction codes are used to distinguish normal retirements from sales, reimbursements, abnormal retirements and adjustments. Transaction codes are also assigned to transfers, capital leases and other accounting activity which should be considered in a depreciation study.

The first data source was an electronic file historically provided to the Missouri Commission to conduct independent analyses. While the file included vintage years since inception through 1997, it did not provide a distinction between additions, transfers, and adjustments. The file, therefore, was recreated by the Company using a legacy system database to provide the appropriate distinctions. A translation program was then used by Foster Associates to create a database in a format compatible with the software used to conduct the depreciation study.

The second source of data was the current CPR system installed and initialized by Aquila on January 1, 1998. The database obtained from this system included activity year transactions over the period 1998-2001 and the age distribution of surviving plant at December 31, 2001. Age distributions at December 31, 2001 were used in conjunction with activity year transactions to reverse the transaction flow and generate an age distribution at December 31, 1997. The resulting age distributions were then compared to the age distributions generated by the Commission database. Differences were coded as vintage adjustments in 1997 to interconnect and provide continuity between the two databases. Care was taken in creating the Foster Associates database to ensure a proper mapping of the legacy system account structure to the current CPR account structure. No attempt, however, was made to reconcile the Foster Associates database to the historical Commission database because of the treatment of adjusting transactions in the Commission database.

The accuracy and completeness of the assembled data base was verified by Foster Associates for activity years 1998 through 2001 by comparing the beginning plant balance, additions, retirements, transfers and adjustments, and the ending plant balance derived for each activity year to the official plant records of the Company. Age distributions of surviving plant at December 31, 2001 were reconciled to the CPR.

LIFE ANALYSIS AND ESTIMATION

Life analysis and life estimation are terms used to describe a two-step procedure for estimating the mortality characteristics of a plant category. The first step (*i.e.*, life analysis) is largely mechanical and primarily concerned with history. Statistical techniques are used in this step to obtain a mathematical description of the forces of retirement acting upon a plant category and an estimate of service life known as the *projection life* of the account. The mathematical expressions used to describe these life characteristics are known as *survival functions* or *survivor curves*.

The second step (*i.e.*, life estimation) is concerned with predicting the expected remaining life of property units still exposed to the forces of retirement. It is a process of blending the results of the life analysis with informed judgment (including expectations about the future) to obtain an appropriate projection life and curve. The amount of weight given to the life analysis will depend upon the extent to which past retirement experience is considered descriptive of the future.

The analytical methods used in a life analysis are broadly classified as actuarial and semi-actuarial techniques. Actuarial techniques can be applied to plant accounting records that reveal the age of a plant asset at the time of its retirement from service. Stated differently, each property unit must be identifiable by date of installation and age at retirement. Semi-actuarial techniques can be used to derive service life and dispersion estimates when age identification of retirements is not maintained or readily available.

An actuarial life analysis program designed and developed by Foster Associates was used in this study. The first step in an actuarial analysis involves a systematic treatment of the available data for the purpose of constructing an observed life table. A complete life table contains the life history of a group of property units installed during the same accounting period and various probability relationships derived from the data. A life table is arranged by age-intervals (usually defined as one year) and shows the number of units (or dollars) entering and leaving each age-interval and probability relationships associated with this activity. A life table minimally shows the age of each survivor and the age of each retirement from a group of units installed in a given accounting year.

A life table can be constructed in any one of at least five alternative methods. The annual-rate or retirement-rate method was used in this study. The mechanics of the annual-rate method require the calculation of a series of ratios obtained by dividing the number of units (or dollars) surviving at the beginning of an age interval into the number of units (or dollars) retired during the same interval. This ratio (or set of ratios) is commonly referred to as retirement ratios. The cumulative proportion surviving is obtained by multiplying the retirement ratio for each age interval by the proportion of the original group surviving at the beginning of that age interval and subtracting this product from the proportion surviving at the beginning of the same interval. The annual-rate method is applied to multiple groups or vintages by combining the retirements and/or survivors of like ages for each vintage included in the analysis.

The second step in an actuarial analysis involves graduating or smoothing the observed life table and fitting the smoothed series to a family of survival functions. The functions used in this study are the Iowa-type curves which are mathematically described in terms of the Pearson frequency curve family. The observed life table was smoothed by a weighted least-squares procedure in which first, second and third degree polynomials were fitted to the observed retirement ratios. The resulting function can be expressed in terms of a survivorship function which is numerically integrated to obtain an estimate of the average service life. The smoothed survivorship function is then fitted by a weighted least-squares procedure to the Iowa-curve family to obtain a mathematical description or classification of the dispersion characteristics of the data.

The set of computer programs used in this analysis provides multiple rolling-band and shrinking-band analyses of an account. Observation bands are defined for a "retirement era" which restricts the analysis to the retirement activity of all vintages represented by survivors at the beginning of a selected era. In a rolling-band analysis, a year of retirement experience is added to each successive retirement band and the earliest year from the preceding band is dropped. A shrinking-band analysis begins with the total retirement experience available and the earliest year from the preceding band is dropped for each successive band. Rolling and shrinking band analyses are used to detect the emergence of trends in the behavior of the dispersion and average service life.

Options available in the actuarial life analysis program include the width and location of both placement and observation bands; the interval of years included in a selected rolling or shrinking band analysis; the estimator of the hazard rate (actuarial, conditional proportion retired, or maximum likelihood); the elements to include on the diagonal of a weight matrix (exposures, inverse of age, inverse of variance, or unweighted); and the age at which an observed life table is truncated. The program also provides tabular and graphics output as an aid in the analysis and optionally produces data output files used in the calculation of depreciation accruals.

While actuarial and semi-actuarial statistical methods are well suited to an analysis of plant categories containing a large number of homogeneous units (*e.g.*, mains and services), the concept of retirement dispersion is inappropriate for plant categories composed of major items of plant that will most likely be retired as a single unit. Plant retirements from an integrated system prior to the retirement of the entire facility are more properly viewed as interim retirements that will be replaced in order to maintain the integrity of the system. Additionally, plant facilities may be added to the existing system (*i.e.*, interim additions) in order to expand or enhance its productive capacity without extending the service life of the present system. A proper depreciation rate can be developed for an integrated system using a life-span method. All plant accounts were treated as full mortality categories in this study.

Net Salvage Analysis

Depreciation rates designed to achieve the goals and objectives of depreciation accounting will include a parameter for future net salvage and a variable for average net salvage which reflects both realized and future net salvage rates.

An estimate of the net salvage rate applicable to future retirements is most often obtained from an analysis of gross salvage and removal expense realized in the past. An analysis of past experience (including an examination of trends over time) provides an appropriate basis for estimating future salvage and cost of removal. However, consideration should also be given to events that may cause deviations from net salvage realized in the past. Among the factors that should be considered are the age of plant retirements; the portion of retirements likely to be reused; changes in the method of removing plant; the type of plant to be retired in the future; inflation expectations; the shape of the projection life curve; and economic conditions that may warrant greater or lesser weight to be given to the net salvage observed in the past.

Special consideration should also be given to the treatment of insurance proceeds and other forms of third-party reimbursements credited to the depreciation reserve. A properly conducted net salvage study will exclude such activity from the estimate of future parameters and include the activity in the computation of realized and average net salvage rates.

A traditional, historical analysis using a five-year moving average of the ratio of realized salvage and removal expense to the associated retirements was used in this study to a) estimate a realized net salvage rate; b) detect the emergence of historical trends; and c) establish a basis for estimating a future net salvage rate. Cost of removal and salvage opinions obtained from Company engineers were blended with judgment and historical net salvage indications in developing estimates of the future.

The average net salvage rate for an account was estimated using direct dollar weighting of historical retirements with the historical net salvage rate, and future retirements (*i.e.*, surviving plant) with the estimated future net salvage rate. The computation of the estimated average net salvage rate for each rate category is shown in Statement D.

Depreciation Reserve Analysis

The purpose of a depreciation reserve analysis is to compare the current level of the recorded reserve with the level required to achieve the goals or objectives of depreciation accounting if the amount and timing of future retirements and net salvage are realized as predicted. The difference between the required depreciation reserve and the recorded reserve provides a measurement of the expected excess or shortfall that will remain in the depreciation reserve if corrective action is not taken to eliminate the reserve imbalance.

Unlike a recorded reserve which represents the net amount of depreciation expense charged to previous periods of operations, a theoretical reserve is a measure of the implied reserve requirement at the beginning of a study year if the timing of future retirements and net salvage is in exact conformance with a survivor curve chosen to predict the probable life of plant units still exposed to the forces of retirement. Stated differently, a theoretical depreciation reserve is the difference between the recorded cost of plant presently in service and the sum of the depreciation expense and net salvage that will be charged in the future if plant retirements are distributed over time according to a specified retirement frequency distribution.

The survivor curve used in the calculation of a theoretical depreciation reserve is intended to describe forces of retirement that will be operative in the future. However, retirements caused by forces such as accidents, physical deterioration and changing technology seldom, if ever, remain stable over time. It is unlikely, therefore, that a probability or retirement frequency distribution can be identified that will accurately describe the age of plant retirements over the complete life cycle of a vintage. It is for this reason that depreciation rates should be reviewed periodically and adjusted for observed or expected changes in the parameters chosen to describe the underlying forces of mortality.

Although reserve records are commonly maintained by various account classifications, the total reserve for a company is the most important measure of the status of the company's depreciation practices. If statistical life studies have not been conducted or retirement dispersion has been ignored in setting depreciation rates, it is likely that some accounts will be over-depreciated and other accounts will be under-depreciated relative to a calculated theoretical reserve. Differences between the theoretical reserve and the recorded reserve also will arise as a normal occurrence when service lives, dispersion patterns and net salvage estimates are adjusted in the course of depreciation reviews. It is appropriate, therefore, and consistent with group depreciation theory to periodically redistribute or rebalance the total recorded reserve among the various primary accounts based upon the most recent estimates of retirement dispersion and net salvage rates.

A redistribution of recorded reserves is appropriate for MPS at this time. Although recorded reserves have been maintained by primary account, these reserves were largely ignored in the development of the presently prescribed whole-life accrual rates. The present rates were established by negotiations and compromise without considering the reserve ratios contemplated in the settled rates. This failure to address prior reserve imbalances produces an added dimension of instability in accrual rates beyond the variability attributable to the parameters estimated in the current study. A redistribution of the recorded reserve is necessary, therefore, to develop an initial reserve balance for each primary account consistent with the age distributions and estimates of retirement dispersion developed in this study.

A redistribution of the recorded reserve was achieved for MPS by multiplying the calculated reserve for each primary account within a function by the ratio of the function total recorded reserve to the function total calculated reserve. The sum of the redistributed reserves within a function is, therefore, equal to the function total recorded depreciation reserve before the redistribution.

Statement C provides a comparison of the computed and recorded reserves for MPS on December 31, 2001. The recorded reserve was $26,053,965, or 31.1 percent of the depreciable plant investment. The corresponding computed reserve is $31,660,494 or 37.8 percent of the depreciable plant investment. A proportionate amount of the measured reserve imbalance of $5,606,529 will be amortized over the composite weighted-average remaining life of each rate category.

Development of Accrual Rates

The goal or objective of depreciation accounting is cost allocation over the economic life of an asset in proportion to the consumption of service potential. Ideally, the cost of an asset—which represents the cost of obtaining a bundle of service units—should be allocated to future periods of operation in proportion to the amount of service potential expended during an accounting interval. The service potential of an asset is the present value of future net revenue (*i.e.*, revenue less expenses exclusive of depreciation and other non-cash expenses) or cash inflows attributable to the use of that asset alone.

Cost allocation in proportion to the consumption of service potential is often approximated by the use of depreciation methods employing time rather than net revenue as the apportionment base. Examples of time-based methods include sinking-fund, straight-line, declining balance, and sum-of-the-years' digits. The advantage of using a time-based method is that it does not require an estimate of the remaining amount of service capacity an asset will provide or the amount of capacity actually consumed during an accounting interval. Using a time-based allocation method, however, does not change the goal of depreciation accounting. If it is predictable that the net revenue pattern of an asset will either decrease or increase over time, then an accelerated or decelerated time-based method should be used to approximate the rate at which service potential is actually consumed.

The time period over which the cost of an asset will be allocated to operations is determined by the combination of a procedure and a technique. A depreciation procedure describes the level of grouping or sub-grouping of assets within a plant category. The broad group, vintage group, equal-life group, and item or unit are a few of the more widely used procedures. A depreciation technique describes the life statistic used in a depreciation system. The whole life and remaining life (or expectancy) are the most common techniques.

Depreciation rates recommended in this study were developed using a system composed of the straight-line method, vintage group procedure, whole-life technique with amortization of reserve imbalances over the estimated remaining life of each rate category. This formulation of the accrual rate is equivalent to a straight-line method, vintage group procedure, remaining-life technique. It is the opinion of Foster Associates that this system will remain appropriate for MPS, provided depreciation studies are conducted periodically and parameters are routinely adjusted to reflect changing operating conditions.

STATEMENTS

INTRODUCTION

This section provides a comparative summary of depreciation rates, annual depreciation accruals, recorded and computed depreciation reserves, and present and proposed service life statistics recommended for MPS gas operations. The content of these statements is briefly described below.

- Statement A provides a comparative summary of present and proposed annual depreciation rates using the vintage group procedure, whole-life technique with amortization of reserve imbalances.
- Statement B provides a comparison of the present and proposed annualized 2002 depreciation accruals based upon the rates developed in Statement A.
- Statement C provides a comparison of the recorded, computed and redistributed reserves for each rate category at December 31, 2001.
- Statement D provides a summary of the components used to obtain a weighted average net salvage rate for each rate category.
- Statement E provides a comparative summary of present and proposed parameters including projection life, projection curve, average service life, and average remaining life.

Present depreciation accruals shown on Statement B are the product of the plant investment (Column B) and the present depreciation rates (Column D) shown on Statement A. These are the effective rates used by the Company for the mix of investments recorded on December 31, 2001. Similarly, proposed depreciation accruals shown on Statement B are the product of the plant investment and the proposed depreciation rates (Column I) shown on Statement A. Proposed accrual rates shown on Statement A are given by:

$$\textit{Accrual Rate} = \frac{1.0 - \textit{Average Net Salvage}}{\textit{Average Life}} + \frac{\textit{Computed Reserve} - \textit{Recorded Reserve}}{\textit{Remaining Life}}$$

where *Average Net Salvage*, *Computed Reserve* and *Recorded Reserve* are expressed in percent. This formulation of the accrual rate is equivalent to

$$\textit{Accrual Rate} = \frac{1.0 - \textit{Reserve Ratio} - \textit{Future Net Salvage Rate}}{\textit{Remaining Life}}.$$

AQUILA NETWORKS - MPS (GAS OPERATIONS)

Statement A

Comparison of Present and Proposed Accrual Rates
Present: VG Procedure / WL Technique
Proposed: VG Procedure / RL Technique

	Present			Proposed				
Account Description	Avg. Life	Net Salvage	Accrual Rate	Avg. Life	Avg. Net Salvage	W/L Rate	Amorti-zation	R/L Rate
A	B	C	D	E	F	G	H	I=G+H
TRANSMISSION PLANT								
365003 Land Rights and Rights of Way	60.00		1.67%	50.64		1.97%	-0.54%	1.43%
366001 Structures and Improvements	30.00		3.33%	50.20		1.99%	-0.36%	1.63%
367100 Mains - Metallic	63.00	-5.0%	1.67%	62.09	-9.7%	1.77%	-0.45%	1.32%
369003 Measuring and Regulating Equipment	51.00	-20.0%	2.35%	45.12	-4.9%	2.32%	-0.26%	2.06%
Total Transmission Plant			1.71%	60.51	-9.2%	1.80%	-0.44%	1.36%
DISTRIBUTION PLANT								
375001 Structures and Improvements	36.00		2.78%	37.59		2.66%	0.58%	3.24%
376100 Mains - Metallic	50.00	-20.0%	2.40%	43.80	-24.3%	2.84%	0.65%	3.49%
376200 Mains - Nonmetallic	50.00	-20.0%	2.40%	45.04	-35.0%	3.00%	0.20%	3.20%
378000 Measuring and Regulating Equipment	50.00	-20.0%	2.40%	41.93	-8.5%	2.59%	0.43%	3.02%
379000 Meas. and Reg. Equipment - City Gate	51.00	-20.0%	2.35%	50.60	-5.5%	2.08%	0.25%	2.33%
380100 Services - Metallic	31.00	-45.0%	4.68%	37.07	-59.4%	4.30%	0.45%	4.75%
380200 Services - Nonmetallic	31.00	-45.0%	4.68%	38.64	-50.2%	3.89%	0.43%	4.32%
381000 Meters	60.00		1.67%	39.17	-0.5%	2.57%	0.20%	2.77%
382001 Meter Installations	50.00		2.00%	45.03	-48.9%	3.31%	0.23%	3.54%
383001 House Regulators	40.00		2.50%	40.61	-21.8%	3.00%	0.35%	3.35%
385001 Meas. and Reg. Equipment - Industrial	54.00	-20.0%	2.22%	46.52	-10.3%	2.37%	0.23%	2.60%
385002 Large Volume Meters	54.00	-20.0%	2.22%	37.99	-5.4%	2.77%	0.14%	2.91%
Total Distribution Plant			3.07%	41.89	-37.5%	3.28%	0.33%	3.61%
GENERAL PLANT								
390001 Structures and Improvements	50.00		2.00%	51.08	-6.1%	2.08%	-0.24%	1.84%
391001 Office Furniture and Equipment	14.00	2.0%	7.00%	15.01		6.66%	-1.62%	5.04%
391003 Computer Hardware	4.00	10.0%	22.50%	5.94		16.84%	-4.89%	11.95%
391004 Computer Software	4.00	10.0%	22.50%	5.27		18.98%	-8.94%	10.04%
393000 Stores Equipment	14.00		7.14%	21.82		4.58%	-0.80%	3.78%
394000 Tools and Work Equipment	15.00		6.67%	26.78	0.2%	3.73%	-0.73%	3.00%
395000 Laboratory Equipment	22.00		4.55%	30.36		3.29%	-0.48%	2.81%
397000 Communication Equipment	29.00		3.45%	20.44	-0.1%	4.90%	-1.18%	3.72%
398000 Miscellaneous Equipment	17.00		5.88%	23.02		4.34%	-1.22%	3.12%
Total General Plant			9.96%	13.13	-0.6%	7.66%	-2.00%	5.66%
TOTAL DEPRECIABLE PLANT			3.12%	41.19	-34.3%	3.26%	0.20%	3.46%

AQUILA NETWORKS - MPS (GAS OPERATIONS)

Statement B

Comparison of Present and Proposed Accruals
Present: VG Procedure / WL Technique
Proposed: VG Procedure / RL Technique

Account Description	12/31/01 Plant Investment	2002 Annualized Accrual				
		Present	Proposed			Difference
			Whole-Life	Amortization	Total	
A	B	C	D	E	F=D+E	G=F-C
TRANSMISSION PLANT						
365003 Land Rights and Rights of Way	$228,277	$3,812	$4,497	($1,233)	$3,264	($548)
366001 Structures and Improvements	10,880	362	217	(40)	177	(185)
367100 Mains - Metallic	6,702,619	111,934	118,636	(30,161)	88,475	(23,459)
369003 Measuring and Regulating Equipment	372,214	8,747	8,635	(967)	7,668	(1,079)
Total Transmission Plant	$7,313,990	$124,855	$131,985	($32,401)	$99,584	($25,271)
DISTRIBUTION PLANT						
375001 Structures and Improvements	$59,033	$1,641	$1,570	$343	$1,913	$272
376100 Mains - Metallic	7,123,472	170,963	202,307	46,302	248,609	77,646
376200 Mains - Nonmetallic	34,258,667	822,208	1,027,760	68,517	1,096,277	274,069
378000 Measuring and Regulating Equipment	231,404	5,554	5,993	995	6,988	1,434
379000 Meas. and Reg. Equipment - City Gate	418,109	9,826	8,697	1,045	9,742	(84)
380100 Services - Metallic	5,484,828	256,690	235,848	24,681	260,529	3,839
380200 Services - Nonmetallic	17,713,008	828,969	689,036	76,166	765,202	(63,767)
381000 Meters	2,833,362	47,317	72,817	5,667	78,484	31,167
382001 Meter Installations	3,602,987	72,060	119,259	8,287	127,546	55,486
383001 House Regulators	2,342,246	58,556	70,267	8,198	78,465	19,909
385001 Meas. and Reg. Equipment - Industrial	163,657	3,633	3,879	376	4,255	622
385002 Large Volume Meters	116,633	2,589	3,231	163	3,394	805
Total Distribution Plant	$74,347,406	$2,280,006	$2,440,664	$240,740	$2,681,404	$401,398
GENERAL PLANT						
390001 Structures and Improvements	$235,258	$4,705	$4,893	($564)	$4,329	($376)
391001 Office Furniture and Equipment	61,361	4,295	4,087	(994)	3,093	(1,202)
391003 Computer Hardware	590,252	132,807	99,398	(28,863)	70,535	(62,272)
391004 Computer Software	4,124	928	783	(369)	414	(514)
393000 Stores Equipment	9,833	702	450	(78)	372	(330)
394000 Tools and Work Equipment	561,199	37,432	20,933	(4,097)	16,836	(20,596)
395000 Laboratory Equipment	136,442	6,208	4,489	(655)	3,834	(2,374)
397000 Communication Equipment	399,763	13,792	19,588	(4,717)	14,871	1,079
398000 Miscellaneous Equipment	47,150	2,772	2,046	(575)	1,471	(1,301)
Total General Plant	$2,045,382	$203,641	$156,667	($40,912)	$115,755	($87,886)
TOTAL DEPRECIABLE PLANT	$83,706,778	$2,608,502	$2,729,316	$167,427	$2,896,743	$288,241

AQUILA NETWORKS - MPS (GAS OPERATIONS)

Statement C

Depreciation Reserve Summary
Vintage Group Procedure
December 31, 2001

Account Description	Plant Investment	Recorded Reserve		Computed Reserve		Redistributed Reserve	
		Amount	Ratio	Amount	Ratio	Amount	Ratio
A	B	C	D=C/B	E	F=E/B	G	H=G/B
TRANSMISSION PLANT							
365003 Land Rights and Rights of Way	$228,277	$45,225	19.81%	$98,451	43.13%	$134,449	58.90%
366001 Structures and Improvements	10,880	7,655	70.36%	3,589	32.99%	4,901	45.05%
367100 Mains - Metallic	6,702,619	4,217,742	62.93%	3,004,322	44.82%	4,102,829	61.21%
369003 Measuring and Regulating Equipment	372,214	98,516	26.47%	92,966	24.98%	126,959	34.11%
Total Transmission Plant	$7,313,990	$4,369,138	59.74%	$3,199,329	43.74%	$4,369,138	59.74%
DISTRIBUTION PLANT							
375001 Structures and Improvements	$59,033	$40,316	68.29%	$26,933	45.62%	$19,930	33.76%
376100 Mains - Metallic	7,123,472	1,728,687	24.27%	4,506,159	63.26%	3,334,436	46.81%
376200 Mains - Nonmetallic	34,258,667	6,613,563	19.30%	9,426,458	27.52%	6,975,326	20.36%
378000 Measuring and Regulating Equipment	231,404	147,704	63.83%	94,654	40.90%	70,041	30.27%
379000 Meas. and Reg. Equipment - City Gate	418,109	195,088	46.66%	135,123	32.32%	99,987	23.91%
380100 Services - Metallic	5,484,828	2,464,912	44.94%	2,378,258	43.36%	1,759,847	32.09%
380200 Services - Nonmetallic	17,713,008	7,008,068	39.56%	7,924,022	44.74%	5,863,564	33.10%
381000 Meters	2,833,362	968,722	34.19%	1,106,089	39.04%	968,722	34.19%
382001 Meter Installations	3,602,987	696,551	19.33%	1,150,012	31.92%	850,978	23.62%
383001 House Regulators	2,342,246	686,475	29.31%	873,901	37.31%	646,663	27.61%
385001 Meas. and Reg. Equipment - Industrial	163,657	75,481	46.12%	48,751	29.79%	36,074	22.04%
385002 Large Volume Meters	116,633	(1,894)	-1.62%	3,708	3.18%	(1,894)	-1.62%
Total Distribution Plant	$74,347,406	$20,623,674	27.74%	$27,674,066	37.22%	$20,623,674	27.74%
GENERAL PLANT							
390001 Structures and Improvements	$235,258	$45,215	19.22%	$61,525	26.15%	$82,947	35.26%
391001 Office Furniture and Equipment	61,361	26,008	42.38%	25,264	41.17%	34,060	55.51%
391003 Computer Hardware	590,252	213,682	36.20%	268,296	45.45%	361,713	61.28%
391004 Computer Software	4,124	1,997	48.41%	2,371	57.50%	3,197	77.51%
393000 Stores Equipment	9,833	6,165	62.70%	3,281	33.36%	4,423	44.98%
394000 Tools and Work Equipment	561,199	549,496	97.91%	201,060	35.83%	271,066	48.30%
395000 Laboratory Equipment	136,442	84,039	61.59%	40,762	29.87%	54,954	40.28%
397000 Communication Equipment	399,763	107,800	26.97%	163,463	40.89%	220,379	55.13%
398000 Miscellaneous Equipment	47,150	26,752	56.74%	21,076	44.70%	28,415	60.26%
Total General Plant	$2,045,382	$1,061,153	51.88%	$787,098	38.48%	$1,061,153	51.88%
TOTAL DEPRECIABLE PLANT	$83,706,778	$26,053,965	31.13%	$31,660,494	37.82%	$26,053,965	31.13%

AQUILA NETWORKS - MPS (GAS OPERATIONS)
Average Net Salvage

Account Description	Plant Investment Additions	Plant Investment Retirements	Plant Investment Survivors	Salvage Rate Realized	Salvage Rate Future	Net Salvage Realized	Net Salvage Future	Net Salvage Total	Average Rate
A	B	C	D=B-C	E	F	G=E*C	H=F*D	I=G+H	J=I/B
TRANSMISSION PLANT									
365003 Land Rights and Rights of Way	$228,277		$228,277						
366001 Structures and Improvements	11,073	193	10,880						
367100 Mains - Metallic	7,097,386	394,767	6,702,619	-4.9%	-10.0%	(19,344)	(670,262)	(689,605)	-9.7%
369003 Measuring and Regulating Equipment	381,318	9,104	372,214		-5.0%		(18,611)	(18,611)	-4.9%
Total Transmission Plant	$7,718,054	$404,064	$7,313,990	-4.8%	-9.4%	($19,344)	($688,873)	($708,216)	-9.2%
DISTRIBUTION PLANT									
375001 Structures and Improvements	$69,023	$9,990	$59,033						
376100 Mains - Metallic	13,519,312	6,395,840	7,123,472	-12.3%	-35.0%	(786,688)	(2,493,215)	(3,279,904)	-24.3%
376200 Mains - Nonmetallic	34,330,249	71,582	34,258,667	-12.3%	-35.0%	(8,805)	(11,990,533)	(11,999,338)	-35.0%
378000 Measuring and Regulating Equipment	272,460	41,056	231,404	-28.2%	-5.0%	(11,578)	(11,570)	(23,148)	-8.5%
379000 Meas. and Reg. Equipment - City Gate	465,188	47,079	418,109	-10.0%	-5.0%	(4,708)	(20,905)	(25,613)	-5.5%
380100 Services - Metallic	9,006,627	3,521,799	5,484,828	-74.1%	-50.0%	(2,609,653)	(2,742,414)	(5,352,067)	-59.4%
380200 Services - Nonmetallic	17,827,512	114,504	17,713,008	-74.1%	-50.0%	(84,847)	(8,856,504)	(8,941,351)	-50.2%
381000 Meters	3,481,551	648,189	2,833,362	-2.7%		(17,501)		(17,501)	-0.5%
382001 Meter Installations	3,696,741	93,754	3,602,987	-6.4%	-50.0%	(6,000)	(1,801,494)	(1,807,494)	-48.9%
383001 House Regulators	2,473,392	131,146	2,342,246	-53.5%	-20.0%	(70,163)	(468,449)	(538,612)	-21.8%
385001 Meas. and Reg. Equipment - Industrial	185,458	21,801	163,657	-12.3%	-10.0%	(2,682)	(16,366)	(19,047)	-10.3%
385002 Large Volume Meters	122,950	6,317	116,633	-12.3%	-5.0%	(777)	(5,832)	(6,609)	-5.4%
Total Distribution Plant	$85,450,463	$11,103,057	$74,347,406	-32.5%	-38.2%	($3,603,402)	($28,407,282)	($32,010,684)	-37.5%
GENERAL PLANT									
390001 Structures and Improvements	$260,083	$24,825	$235,258	-16.9%	-5.0%	($4,195)	($11,763)	($15,958)	-6.1%
391001 Office Furniture and Equipment	61,361		61,361						
391003 Computer Hardware	701,860	111,608	590,252						
391004 Computer Software	4,558	434	4,124						
393000 Stores Equipment	18,925	9,092	9,833						
394000 Tools and Work Equipment	704,189	142,990	561,199	1.1%		1,573		1,573	0.2%
395000 Laboratory Equipment	172,816	36,374	136,442						
397000 Communication Equipment	413,338	13,575	399,763	-1.7%		(231)		(231)	-0.1%
398000 Miscellaneous Equipment	55,288	8,138	47,150						
Total General Plant	$2,392,418	$347,036	$2,045,382	-0.8%	-0.6%	($2,853)	($11,763)	($14,616)	-0.6%
TOTAL DEPRECIABLE PLANT	$95,560,935	$11,854,157	$83,706,778	-30.6%	-34.8%	($3,625,599)	($29,107,918)	($32,733,517)	-34.3%

AQUILA NETWORKS - MPS (GAS OPERATIONS)

Statement E

Present and Proposed Parameters
Vintage Group Procedure

	Present Parameters						Proposed Parameters					
Account Description	P-Life/ AYFR	Curve Shape	VG ASL	Rem. Life	Avg. Sal.	Fut. Sal.	P-Life/ AYFR	Curve Shape	VG ASL	Rem. Life	Avg. Sal.	Fut. Sal.
A	B	C	D	E	F	G	H	I	J	K	L	M
TRANSMISSION PLANT												
365003 Land Rights and Rights of Way	60.00	R5	60.00				50.00	R3	50.64	28.80	0.0	0.0
366001 Structures and Improvements	30.00	S4	30.00				50.00	S1.5	50.20	33.64	0.0	0.0
367100 Mains - Metallic	60.00	L2	63.00		-5.0	-5.0	60.00	L2	62.09	36.89	-9.7	-10.0
369003 Measuring and Regulating Equipment	50.00	R1	51.00		-20.0	-20.0	45.00	S1.5	45.12	34.42	-4.9	-5.0
Total Transmission Plant									60.51	36.48	-9.2	-9.4
DISTRIBUTION PLANT												
375001 Structures and Improvements	36.00	S5	36.00				36.00	S5	37.59	20.44	0.0	0.0
376100 Mains - Metallic	50.00	S1.5	50.00		-20.0	-20.0	45.00	S1.5	43.80	25.28	-24.3	-35.0
376200 Mains - Nonmetallic	50.00	S1.5	50.00		-20.0	-20.0	45.00	S1.5	45.04	35.86	-35.0	-35.0
378000 Measuring and Regulating Equipment	50.00	R1	50.00		-20.0	-20.0	40.00	R2	41.93	24.77	-8.5	-5.0
379000 Meas. and Reg. Equipment - City Gate	50.00	R1	51.00		-20.0	-20.0	50.00	R2	50.60	34.86	-5.5	-5.0
380100 Services - Metallic	35.00	R2	31.00		-45.0	-45.0	38.00	L2	37.07	24.80	-59.4	-50.0
380200 Services - Nonmetallic	35.00	R2	31.00		-45.0	-45.0	38.00	L2	38.64	27.08	-50.2	-50.0
381000 Meters	60.00	S6	60.00				38.00	R3	39.17	23.76	-0.5	0.0
382001 Meter Installations	50.00	SQ	50.00				45.00	R5	45.03	35.71	-48.9	-50.0
383001 House Regulators	40.00	S6	40.00				40.00	S6	40.61	27.57	-21.8	-20.0
385001 Meas. and Reg. Equipment - Industrial	50.00	R1	54.00		-20.0	-20.0	45.00	R1	46.52	33.83	-10.3	-10.0
385002 Large Volume Meters	50.00	R1	54.00		-20.0	-20.0	38.00	S-.5	37.99	36.70	-5.4	-5.0
Total Distribution Plant									41.89	30.63	-37.5	-38.2
GENERAL PLANT												
390001 Structures and Improvements	49.00	R0.5	50.00				50.00	R1	51.08	37.96	-6.1	-5.0
391001 Office Furniture and Equipment	15.00	SQ	14.00		2.0	2.0	15.00	S3	15.01	8.83	0.0	0.0
391003 Computer Hardware	5.00	R2	4.00		10.0	10.0	6.00	L2	5.94	3.24	0.0	0.0
391004 Computer Software	5.00	R2	4.00		10.0	10.0	5.00	R2	5.27	2.24	0.0	0.0
393000 Stores Equipment	15.00	L2	14.00				20.00	O2	21.82	14.54	0.0	0.0
394000 Tools and Work Equipment	15.00	L0	15.00				27.00	S0.5	26.78	17.22	0.2	0.0
395000 Laboratory Equipment	23.00	R1	22.00				30.00	L1	30.36	21.29	0.0	0.0
397000 Communication Equipment	29.00	R3	29.00				20.00	S1.5	20.44	12.07	-0.1	0.0
398000 Miscellaneous Equipment	15.00	R1.5	17.00				23.00	S4	23.02	12.73	0.0	0.0
Total General Plant									13.13	8.61	-0.6	-0.6
TOTAL DEPRECIABLE PLANT									41.19	29.96	-34.3	-34.8

ANALYSIS

INTRODUCTION

This section provides an explanation of the supporting schedules developed in the MPS gas operations depreciation study to estimate appropriate projection curves, projection lives and statistics for each rate category. The form and content of the schedules developed for an account depend upon the method of analysis adopted for the category.

This section also includes an example of the supporting schedules developed for Account 380100 – Services (Metallic) as an illustration.[1] Documentation for all other plant accounts is contained in the study work papers. The supporting schedules developed in the MPS study include:

Schedule A – Generation Arrangement;

Schedule B – Age Distribution;

Schedule C – Unadjusted Plant History;

Schedule D – Adjusted Plant History;

Schedule E – Actuarial Life Analysis;

Schedule F – Graphics Analysis; and

Schedule G – Historical Net Salvage Analysis.

The format and content of these schedules are briefly described below.

SCHEDULE A – GENERATION ARRANGEMENT

The purpose of this schedule is to obtain appropriate weighted-average life statistics for a rate category. The weighted-average remaining-life is the sum of Column H divided by the sum of Column I. The weighted average life is the sum of Column C divided by the sum of Column I.

It should be noted that the generation arrangement does not include parameters for net salvage. Computed Net Plant (Column H) and Accruals (Column I) must be adjusted for net salvage to obtain a correct measurement of theoretical reserves and annualized depreciation accruals.

The following table provides a description of each column in the generation arrangement.

[1] Metallic and Nonmetallic services were combined in the statistical analysis of service lives and realized net salvage rates. Average service lives, remaining lives and average net salvage rates were estimated for the constituent accounts.

Generation Arrangement

Column	Title	Description
A	Vintage	Vintage or placement year of surviving plant.
B	Age	Age of surviving plant at beginning of study year.
C	Surviving Plant	Actual dollar amount of surviving plant.
D	Average Life	Estimated average life of each vintage. This statistic is the sum of the realized life and the unrealized life, which is the product of the remaining life (Column E) and the theoretical proportion surviving.
E	Remaining Life	Estimated remaining life of each vintage.
F	Net Plant Ratio	Theoretical net plant ratio of each vintage.
G	Allocation Factor	A pivotal ratio which determines the amortization period of the difference between the recorded and computed reserve.
H	Computed Net Plant	Plant in service less theoretical reserve for each vintage.
I	Accrual	Ratio of computed net plant (Column H) and remaining life (Column E).

TABLE 2. GENERATION ARRANGEMENT

SCHEDULE B – AGE DISTRIBUTION

This schedule provides the age distribution and realized life of surviving plant shown in Column C of the Generation Arrangement (Schedule A). The format of the schedule depends upon the availability of either aged or unaged data. Derived additions for vintage years older than the earliest activity year in an account for unaged data are obtained from the age distribution of surviving plant at the beginning of the earliest activity year. The amount surviving from these vintages is shown in Column D. The realized life (Column G) is derived from the dollar years of service provided by a vintage over the period of years the vintage has been in service. Plant additions for vintages older than the earliest activity year in an account are represented by the opening balances shown in Column D.

The computed proportion surviving (Column D) for unaged is derived from a computed mortality analysis. The average service life displayed in the title block is the life statistic derived for the most recent activity year, given the derived age distribution at the start of the year and the specified retirement dispersion. The realized life (Column F) is obtained by finding the slope of an SC retirement dispersion, which connects the computed survivors of a vintage (Column E) to the recorded vintage addition (Column B). The realized life is the area bounded by the

SC dispersion, the computed proportion surviving and the age of the vintage.

SCHEDULE C – UNADJUSTED PLANT HISTORY

This schedule provides a summary of recorded plant data extracted from the continuing property records maintained by the Company. Activity year total amounts shown on this schedule for aged data are obtained from a historical arrangement of the data base in which all plant accounting transactions are identified by vintage and activity year. Activity year totals for unaged data are obtained from a transaction file without vintage identification. Information displayed in the unadjusted plant history is consistent with regulated investments reported internally by the Company.

SCHEDULE D – ADJUSTED PLANT HISTORY

This schedule provides a summary of recorded plant data extracted from the continuing property records maintained by the Company with sales, transfers, and adjustments appropriately aged for depreciation study purposes. Activity year total amounts shown on this schedule for aged data are obtained from a historical arrangement of the data base in which all plant accounting transactions are identified by vintage and activity year. Ageing of adjusting transactions is achieved using transaction codes that identify an adjusting year associated with the dollar amount of a transaction. Adjusting transactions processed in the adjusted plant history are not aged in the Company's records nor in the unadjusted plant history.

SCHEDULE E – ACTUARIAL LIFE ANALYSIS

These schedules provide a summary of the dispersion and life indications obtained from an actuarial life analysis for a specified placement band. The observation band (Column A) is specified to produce either a rolling-band or a shrinking-band analysis depending upon the movement of the end points of the band. The degree of censoring (or point of truncation) of the observed life table is shown in Column B for each observation band. The estimated average service life, best fitting Iowa dispersion, and a statistical measure of the goodness of fit are shown for each degree polynomial (First, Second, and Third) fitted to the estimated hazard rates. Options available in the analysis include the width and location of both the placement and observation bands; the interval of years included in a selected rolling or shrinking band analysis; the estimator of the hazard rate (actuarial, conditional proportion retired, or maximum likelihood); the elements to include on the diagonal of a weight matrix (exposures, inverse of age, inverse of variance, or unweighted); and the age at which an observed life table is truncated.

The estimated average service lives (Columns C, F, and I) are flagged with an asterisk if negative hazard rates are indicated by the fitted polynomial. All negative hazard rates are set equal to zero in the calculation of the graduated survivor curve. The Conformance Index (Columns E, H, and K) is the square root of the mean sum-of-squared differences between the graduated survivor curve and the best fitting Iowa curve. A Conformance Index of zero would indicate a perfect fit.

Schedule F – Graphics Analysis

This schedule provides a graphics plot of a) the observed proportion surviving for a selected placement and observation band; b) the statistically best fitting Iowa dispersion and derived average service life; and c) the projection curve and projection life selected to describe future forces of mortality.

Schedule G – Historical Net Salvage Analysis

This schedule provides a moving average analysis of the ratio of realized net salvage (Column I) to the associated retirements (Column B). The schedule also provides a moving average analysis of the components of net salvage related to retirements. The ratio of gross salvage to retirements is shown in Column D and the ratio of cost of removal to retirements is shown in Column G.

AQUILA NETWORKS - MPS GAS OPERATIONS

Distribution Plant
Account: 380100 Services - Metallic

Dispersion: 38 - L2
Procedure: Vintage Group

Generation Arrangement

	December 31, 2001							
Vintage	Age	Surviving Plant	Avg. Life	Rem. Life	Net Plant Ratio	Alloc. Factor	Computed Net Plant	Accrual
A	B	C	D	E	F	G	H=C*F*G	I=H/E
2001	0.5	(1,110)	38.00	37.50	0.9868	1.0000	(1,095)	(29)
2000	1.5	7,563	37.93	36.50	0.9624	1.0000	7,279	199
1999	2.5	2,826	37.85	35.51	0.9383	1.0000	2,652	75
1998	3.5	27,319	38.00	34.53	0.9087	1.0000	24,824	719
1997	4.5	249,322	38.00	33.56	0.8832	1.0000	220,194	6,561
1996	5.5	313,309	38.00	32.61	0.8580	1.0000	268,824	8,244
1995	6.5	226,777	37.95	31.67	0.8346	1.0000	189,270	5,976
1994	7.5	208,303	37.97	30.75	0.8098	1.0000	168,681	5,486
1993	8.5	239,579	38.01	29.85	0.7852	1.0000	188,114	6,303
1992	9.5	314,013	38.04	28.96	0.7614	1.0000	239,074	8,255
1991	10.5	331,703	38.01	28.09	0.7390	1.0000	245,121	8,726
1990	11.5	346,084	37.68	27.24	0.7229	1.0000	250,173	9,184
1989	12.5	342,524	38.34	26.41	0.6887	1.0000	235,896	8,933
1988	13.5	322,027	39.88	25.59	0.6416	1.0000	206,620	8,074
1987	14.5	190,810	40.26	24.80	0.6160	1.0000	117,532	4,740
1986	15.5	365,070	39.02	24.03	0.6159	1.0000	224,842	9,355
1985	16.5	215,888	39.15	23.30	0.5952	1.0000	128,494	5,514
1984	17.5	248,589	39.86	22.61	0.5672	1.0000	140,990	6,236
1983	18.5	223,650	37.50	21.95	0.5854	1.0000	130,914	5,964
1982	19.5	123,346	35.29	21.33	0.6046	1.0000	74,577	3,496
1981	20.5	93,776	33.49	20.76	0.6197	1.0000	58,117	2,800
1980	21.5	83,129	31.36	20.22	0.6448	1.0000	53,598	2,651
1979	22.5	63,946	30.83	19.71	0.6393	1.0000	40,883	2,074
1978	23.5	74,271	29.19	19.24	0.6594	1.0000	48,972	2,545
1977	24.5	57,177	31.90	18.81	0.5896	1.0000	33,711	1,792
1976	25.5	74,087	30.78	18.40	0.5979	1.0000	44,296	2,407
1975	26.5	42,947	28.56	18.02	0.6310	1.0000	27,099	1,504
1974	27.5	41,628	29.99	17.67	0.5891	1.0000	24,525	1,388
1973	28.5	37,792	32.16	17.33	0.5389	1.0000	20,368	1,175
1972	29.5	34,005	31.23	17.02	0.5449	1.0000	18,529	1,089
1971	30.5	30,622	30.60	16.72	0.5465	1.0000	16,734	1,001
1970	31.5	31,127	33.60	16.44	0.4891	1.0000	15,225	926
1966	35.5	146,970	34.87	15.40	0.4415	1.0000	64,894	4,215
1961	40.5	155,090	36.96	14.19	0.3841	1.0000	59,564	4,197
1958	43.5	129,040	36.45	13.47	0.3695	1.0000	47,684	3,541
1955	46.5	52,676	33.80	12.73	0.3765	1.0000	19,833	1,558
1953	48.5	8,607	32.20	12.23	0.3797	1.0000	3,268	267

AQUILA NETWORKS - MPS GAS OPERATIONS

Distribution Plant
Account: 380100 Services - Metallic

Dispersion: 38 - L2
Procedure: Vintage Group

Generation Arrangement

	December 31, 2001							
Vintage	Age	Surviving Plant	Avg. Life	Rem. Life	Net Plant Ratio	Alloc. Factor	Computed Net Plant	Accrual
A	B	C	D	E	F	G	H=C*F*G	I=H/E
1950	51.5	9,165	34.02	11.47	0.3371	1.0000	3,090	269
1946	55.5	15,643	37.00	10.47	0.2830	1.0000	4,427	423
1941	60.5	2,601	35.88	9.26	0.2581	1.0000	671	72
1937	64.5	845	42.14	8.34	0.1978	1.0000	167	20
1934	67.5	284	67.92	7.67	0.1129	1.0000	32	4
1932	69.5	895	45.38	7.24	0.1596	1.0000	143	20
1925	76.5	702	76.61	5.80	0.0757	1.0000	53	9
1924	77.5	212	55.56	5.60	0.1008	1.0000	21	4
Total	16.1	$5,484,828	37.07	24.80	0.6689	1.0000	$3,668,879	$147,962

AQUILA NETWORKS - MPS GAS OPERATIONS
Distribution Plant
Account: 380100 Services - Metallic

Age Distribution

Vintage	Age as of 12/31/2001	Derived Additions	1961 Opening Balance	Experience to 12/31/2001 Amount Surviving	Proportion Surviving	Realized Life
A	B	C	D	E	F=E/(C+D)	G
2001	0.5	(1,110)		(1,110)	1.0000	0.5000
2000	1.5	8,821		7,563	0.8574	1.4287
1999	2.5	4,062		2,826	0.6958	2.3479
1998	3.5	27,319		27,319	1.0000	3.5000
1997	4.5	249,322		249,322	1.0000	4.5000
1996	5.5	313,309		313,309	1.0000	5.5000
1995	6.5	229,052		226,777	0.9901	6.4377
1994	7.5	214,409		208,303	0.9715	7.4573
1993	8.5	240,155		239,579	0.9976	8.4868
1992	9.5	314,013		314,013	1.0000	9.5000
1991	10.5	333,097		331,703	0.9958	10.4602
1990	11.5	372,322		346,084	0.9295	11.1082
1989	12.5	317,924		342,524	1.0774	12.7388
1988	13.5	225,227		322,027	1.4298	15.2471
1987	14.5	118,146		190,810	1.6150	16.5804
1986	15.5	282,002		365,070	1.2946	16.2950
1985	16.5	165,398		215,888	1.3053	17.3642
1984	17.5	178,697		248,589	1.3911	19.0017
1983	18.5	200,103		223,650	1.1177	17.5579
1982	19.5	111,506		123,346	1.1062	16.2428
1981	20.5	150,673		93,776	0.6224	15.3318
1980	21.5	156,858		83,129	0.5300	14.0615
1979	22.5	222,239		63,946	0.2877	14.3849
1978	23.5	191,445		74,271	0.3879	13.5601
1977	24.5	171,531		57,177	0.3333	17.0747
1976	25.5	233,259		74,087	0.3176	16.7263
1975	26.5	119,337		42,947	0.3599	15.2610
1974	27.5	146,848		41,628	0.2835	17.4121
1973	28.5	156,113		37,792	0.2421	20.2843
1972	29.5	98,053		34,005	0.3468	20.0270
1971	30.5	83,495		30,622	0.3668	20.0369
1970	31.5	85,806		31,127	0.3628	23.6615
1967	34.5	147,915			0.0000	24.3160
1966	35.5	241,400		146,970	0.6088	27.1427
1965	36.5	56,818			0.0000	27.5672
1964	37.5	55,012			0.0000	29.0000
1963	38.5	132,736			0.0000	28.3505
1962	39.5	251,239			0.0000	26.7086

AQUILA NETWORKS - MPS GAS OPERATIONS

Distribution Plant

Account: 380100 Services - Metallic

Age Distribution

Vintage	Age as of 12/31/2001	Derived Additions	1961 Opening Balance	Experience to 12/31/2001 Amount Surviving	Proportion Surviving	Realized Life
A	B	C	D	E	F=E/(C+D)	G
1961	40.5	327,938		155,090	0.4729	31.4447
1958	43.5		561,257	129,040	0.2299	32.0099
1955	46.5		790,850	52,676	0.0666	30.2765
1953	48.5		182,749	8,607	0.0471	29.1943
1950	51.5		193,271	9,165	0.0474	31.6920
1946	55.5		179,293	15,643	0.0872	35.3812
1941	60.5		65,604	2,601	0.0396	34.9099
1937	64.5		34,611	845	0.0244	41.5227
1934	67.5		284	284	1.0000	67.5000
1933	68.5		24,770		0.0000	35.6868
1932	69.5		18,967	895	0.0472	45.0546
1925	76.5		702	702	1.0000	76.5000
1924	77.5		21,783	212	0.0097	55.4654
Total		$6,932,487	$2,074,140	$5,484,828	0.6090	

AQUILA NETWORKS - MPS GAS OPERATIONS

Distribution Plant

Account: 380100 Services - Metallic

Unadjusted Plant History

Year	Beginning Balance	Additions	Retirements	Sales, Transfers & Adjustments	Ending Balance
A	B	C	D	E	F=B+C-D+E
1961	2,547,799	196,216	14,708		2,729,307
1962	2,729,307	235,463	11,227	(41)	2,953,502
1963	2,953,502	214,034	11,722		3,155,814
1964	3,155,814	213,720	10,724		3,358,810
1965	3,358,810	242,416	15,474		3,585,752
1966	3,585,752	195,854	15,090		3,766,516
1967	3,766,516	167,072	19,137	(10,952)	3,903,499
1968	3,903,499	214,068	17,359		4,100,208
1969	4,100,208	211,100	15,745		4,295,563
1970	4,295,563	169,251	15,157		4,449,657
1971	4,449,657	160,768	10,204		4,600,221
1972	4,600,221	197,585	22,397		4,775,409
1973	4,775,409	276,379	44,179	(21,937)	4,985,672
1974	4,985,672	239,299	35,342		5,189,629
1975	5,189,629	205,972	27,792	(2,063)	5,365,746
1976	5,365,746	384,437	77,269	8,122	5,681,036
1977	5,681,036	364,525	58,359	19,939	6,007,141
1978	6,007,141	418,620	71,901	28,494	6,382,354
1979	6,382,354	432,325	52,680	242	6,762,241
1980	6,762,241	493,206	77,403		7,178,044
1981	7,178,044	480,652	87,087	(1,740)	7,569,869
1982	7,569,869	474,200	99,394	28	7,944,703
1983	7,944,703	941,390	149,501		8,736,592
1984	8,736,592	957,100	218,707		9,474,985
1985	9,474,985	824,136	224,646		10,074,475
1986	10,074,475	1,654,751	221,855		11,507,371
1987	11,507,371	688,420	358,941	(1)	11,836,849
1988	11,836,849	1,183,141	418,036		12,601,954
1989	12,601,954	1,277,821	224,249		13,655,526
1990	13,655,526	1,263,351	256,277		14,662,600
1991	14,662,600	1,306,646	637,706		15,331,540
1992	15,331,540	1,555,704	327,350		16,559,894
1993	16,559,894	981,638	190,222	2,494	17,353,804
1994	17,353,804	868,853	132,065		18,090,592
1995	18,090,592	953,192	189,180		18,854,604
1996	18,854,604	1,081,696	459,378		19,476,922
1997	19,476,922	668,711	(1,315,489)	(16,085,835)	5,375,287
1998	5,375,287	272,579	3,224	(87,287)	5,557,354
1999	5,557,354	(53,575)			5,503,779
2000	5,503,779	8,610	11,233		5,501,157

AQUILA NETWORKS - MPS GAS OPERATIONS

Distribution Plant

Account: 380100 Services - Metallic

Unadjusted Plant History

Year	Beginning Balance	Additions	Retirements	Sales, Transfers & Adjustments	Ending Balance
A	B	C	D	E	F=B+C-D+E
2001	5,501,157	(11,961)	4,368		5,484,828

AQUILA NETWORKS - MPS GAS OPERATIONS

Distribution Plant

Account: 380100 Services - Metallic

Adjusted Plant History

Year	Beginning Balance	Additions	Retirements	Sales, Transfers & Adjustments	Ending Balance
A	B	C	D	E	F=B+C-D+E
1961	2,568,575	182,995	14,708		2,736,862
1962	2,736,862	278,473	11,227	(41)	3,004,067
1963	3,004,067	190,855	11,722		3,183,200
1964	3,183,200	214,156	10,724		3,386,632
1965	3,386,632	256,486	15,474		3,627,644
1966	3,627,644	173,677	15,090		3,786,231
1967	3,786,231	175,010	19,137	(10,952)	3,931,152
1968	3,931,152	194,530	17,359		4,108,323
1969	4,108,323	206,898	15,745		4,299,476
1970	4,299,476	202,790	15,157		4,487,109
1971	4,487,109	163,133	10,204		4,640,038
1972	4,640,038	174,422	22,397		4,792,063
1973	4,792,063	264,554	44,179	(21,937)	4,990,501
1974	4,990,501	253,557	35,342		5,208,716
1975	5,208,716	228,988	27,792	(2,063)	5,407,849
1976	5,407,849	392,003	77,269	8,122	5,730,705
1977	5,730,705	333,080	58,359	19,939	6,025,365
1978	6,025,365	450,070	71,901	28,494	6,432,028
1979	6,432,028	432,617	52,680	242	6,812,207
1980	6,812,207	463,773	77,403		7,198,577
1981	7,198,577	478,792	87,087	(1,740)	7,588,542
1982	7,588,542	580,581	99,394	28	8,069,757
1983	8,069,757	936,287	149,501		8,856,543
1984	8,856,543	998,701	218,707		9,636,537
1985	9,636,537	871,242	224,646		10,283,133
1986	10,283,133	1,452,498	221,855		11,513,776
1987	11,513,776	765,712	358,941	(1)	11,920,546
1988	11,920,546	1,285,310	418,036		12,787,820
1989	12,787,820	1,379,257	224,249		13,942,828
1990	13,942,828	1,358,121	256,277		15,044,672
1991	15,044,672	1,341,934	637,706		15,748,900
1992	15,748,900	1,237,896	327,350		16,659,446
1993	16,659,446	969,380	190,222	2,494	17,441,098
1994	17,441,098	837,470	132,065		18,146,503
1995	18,146,503	912,317	189,180		18,869,640
1996	18,869,640	1,167,493	459,378		19,577,755
1997	19,577,755	744,440	(1,315,489)	(16,085,835)	5,551,848
1998	5,551,848	27,319	3,224	(87,287)	5,488,656
1999	5,488,656	4,062			5,492,717
2000	5,492,717	8,821	11,233		5,490,306

AQUILA NETWORKS - MPS GAS OPERATIONS

Distribution Plant

Account: 380100 Services - Metallic

Adjusted Plant History

Year	Beginning Balance	Additions	Retirements	Sales, Transfers & Adjustments	Ending Balance
A	B	C	D	E	F=B+C-D+E
2001	5,490,306	(1,110)	4,368		5,484,828

AQUILA NETWORKS - MPS GAS OPERATIONS

Distribution Plant

Account: 380XXX Services

T-Cut: None

Placement Band: 1924-2001

Hazard Function: Proportion Retired

Weighting: Exposures

Shrinking Band Life Analysis

		First Degree			Second Degree			Third Degree		
Observation Band	Censoring	Average Life	Disper-sion	Conf. Index	Average Life	Disper-sion	Conf. Index	Average Life	Disper-sion	Conf. Index
A	B	C	D	E	F	G	H	I	J	K
1961-2001	8.4	38.7	L1.5 *	0.91	38.1	L2 *	1.37	60.4	O4 *	9.92
1962-2001	8.4	38.7	L1.5 *	0.91	38.1	L2 *	1.36	60.3	O4 *	9.93
1963-2001	8.4	38.7	L1.5 *	0.92	38.1	L2 *	1.36	60.3	O4 *	9.93
1964-2001	8.4	38.7	L1.5 *	0.92	38.1	L2 *	1.36	60.3	O4 *	9.94
1965-2001	8.4	38.7	L1.5 *	0.91	38.0	L2 *	1.36	60.2	O4 *	9.94
1966-2001	8.4	38.7	L1.5 *	0.91	38.0	L2 *	1.35	60.1	O4 *	9.95
1967-2001	8.4	38.6	L1.5 *	0.90	38.0	L2 *	1.35	60.0	O4 *	9.95
1968-2001	8.4	38.6	L1.5 *	0.90	38.0	L2 *	1.34	60.0	O4 *	9.95
1969-2001	8.4	38.6	L1.5 *	0.89	38.0	L2 *	1.33	59.9	O4 *	9.95
1970-2001	8.4	38.5	L1.5 *	0.88	37.9	L2 *	1.32	59.8	O4 *	9.95
1971-2001	8.3	38.5	L1.5 *	0.88	37.9	L2 *	1.30	59.6	O4 *	9.95
1972-2001	8.2	38.3	L1.5 *	0.87	37.8	L2 *	1.28	59.4	O4 *	9.95
1973-2001	8.2	38.3	L1.5 *	0.85	37.8	L2 *	1.26	59.3	O4 *	9.94
1974-2001	8.3	38.3	L1.5 *	0.84	37.8	L2 *	1.26	59.3	O4 *	9.92
1975-2001	8.2	38.2	L1.5 *	0.82	37.8	L2 *	1.24	59.3	O4 *	9.90
1976-2001	8.3	38.1	L1.5 *	0.81	37.7	L2 *	1.22	59.2	O4 *	9.88
1977-2001	8.4	38.2	L1.5 *	0.79	37.7	L2 *	1.22	59.5	O4 *	9.82
1978-2001	8.4	38.1	L1.5 *	0.78	37.7	L2 *	1.21	59.5	O4 *	9.80
1979-2001	8.4	38.1	L1.5 *	0.79	37.7	L2 *	1.18	59.6	O4 *	9.79
1980-2001	8.4	37.9	L1.5 *	0.79	37.6	L2 *	1.17	59.5	O4 *	9.76
1981-2001	8.5	37.9	L1.5 *	0.79	37.6	L2 *	1.16	59.9	O4 *	9.70
1982-2001	9.2	38.0	L1.5 *	0.76	37.7	L2 *	1.18	60.8	O4 *	9.58
1983-2001	9.6	38.0	L1.5 *	0.74	37.9	L1.5 *	1.13	61.6	O4 *	9.49
1984-2001	11.1	38.4	L1.5 *	0.69	38.3	L1.5 *	0.84	64.2	O4 *	9.32
1985-2001	13.7	39.1	L1.5 *	0.67	39.1	L1.5 *	0.65	67.4	O4 *	9.26
1986-2001	17.0	40.1	L1.5 *	0.61	40.2	L1.5 *	0.49	71.5	O4 *	9.31
1987-2001	19.4	40.7	L1.5 *	0.60	40.9	L1.5 *	0.43	74.2	O4 *	9.47
1988-2001	20.9	43.2	L1.5 *	0.51	43.4	L1.5 *	0.40	81.5	O4 *	10.04
1989-2001	24.6	46.0	L1.5 *	0.46	46.2	L1.5 *	0.40	89.5	O4 *	11.17
1990-2001	27.0	48.0	L1.5 *	0.43	48.3	L1.5 *	0.41	95.1	O4 *	12.22
1991-2001	30.4	51.2	L1.5 *	0.42	51.2	L1.5 *	0.42	102.5	O4 *	13.82
1992-2001	41.2	64.3	L1.5 *	0.65	56.9	S1	0.67	114.7	O3 *	15.03
1993-2001	48.6	70.2	L1.5 *	0.66	59.8	S1.5	1.04	117.5	O3 *	15.00
1994-2001	59.1	82.4	L1 *	1.04	64.0	S1.5	0.56	117.2	SC *	13.70
1995-2001	75.4	91.1	L1	0.63	67.3	S1.5	0.72	132.2	SC *	13.31
1996-2001	98.0	128.8	S-.5	2.64	72.9	S2	1.13	115.7	L0 *	10.68
1997-2001	98.3	190.7	R5 *	14.08	84.0	R3 *	1.89	177.4	R2.5 *	16.56

AQUILA NETWORKS - MPS GAS OPERATIONS

Distribution Plant

Account: 380XXX Services

T-Cut: None

Placement Band: 1924-2001

Hazard Function: Proportion Retired

Weighting: Exposures

Shrinking Band Life Analysis

		First Degree			Second Degree			Third Degree		
Observation Band	Censoring	Average Life	Disper-sion	Conf. Index	Average Life	Disper-sion	Conf. Index	Average Life	Disper-sion	Conf. Index
A	B	C	D	E	F	G	H	I	J	K
1998-2001	77.2	167.8	R2	11.89	78.2	S2	1.64	173.1	R2 *	17.02
1999-2001	70.1	185.9	R4 *	15.67	73.7	R3 *	1.71	170.2	R1.5 *	17.15
2000-2001	68.5	181.2	R3 *	17.05	66.7	R3 *	2.18	159.0	R1 *	16.88
2001-2001	92.1	184.3	R4 *	16.49	71.2	R3 *	3.52	176.6	R2.5 *	17.93

AQUILA NETWORKS - MPS GAS OPERATIONS

Distribution Plant

Account: 380XXX Services

T-Cut: None

Placement Band: 1924-2001

Hazard Function: Proportion Retired

Weighting: Exposures

Rolling Band Life Analysis

		First Degree			Second Degree			Third Degree		
Observation Band	Censoring	Average Life	Disper-sion	Conf. Index	Average Life	Disper-sion	Conf. Index	Average Life	Disper-sion	Conf. Index
A	B	C	D	E	F	G	H	I	J	K
1961-1965	51.8	43.2	L1.5*	0.49	42.1	L1.5*	1.23	104.0	O4*	15.72
1962-1966	50.2	44.4	L1.5*	0.58	42.7	L2*	1.24	105.1	O4*	15.91
1963-1967	44.6	43.6	L1.5*	0.75	41.0	S1*	1.14	95.9	O4*	13.57
1964-1968	41.4	44.0	L1.5*	0.84	41.1	S1*	1.06	92.9	O4*	12.78
1965-1969	39.3	44.4	L1.5*	0.96	41.1	S1*	1.19	89.5	O4*	12.00
1966-1970	39.1	46.4	L1.5*	0.98	42.3	S1.5*	1.09	91.0	O4*	12.05
1967-1971	41.7	49.5	L1.5*	0.96	44.1	S1.5*	0.73	93.1	O4*	12.11
1968-1972	42.7	50.1	L2*	1.03	44.2	S1.5*	0.63	87.3	O4*	10.90
1969-1973	34.5	45.2	L2*	0.72	41.1	S1.5*	0.79	78.3	O4*	10.43
1970-1974	24.6	43.8	L2*	0.67	40.2	S1.5*	0.91	71.2	O4*	10.18
1971-1975	19.2	43.8	L2*	0.66	40.1	S1.5*	1.05	68.5	O4*	10.27
1972-1976	13.0	39.9	L2*	0.75	37.4	S2*	1.16	53.8	O3*	11.41
1973-1977	12.3	39.1	L2*	0.72	37.0	S1.5*	1.03	52.4	O3*	11.43
1974-1978	13.7	40.5	L2*	0.79	37.6	S1.5*	0.66	53.0	O3*	11.12
1975-1979	17.3	41.1	L2*	0.92	38.0	S1.5*	0.55	54.0	O3*	11.09
1976-1980	16.2	39.9	L2*	1.02	36.9	S1.5	0.44	48.8	O3*	11.14
1977-1981	12.5	39.8	L2*	1.01	36.7	S1.5	0.98	44.9	L2*	8.84
1978-1982	8.5	38.8	L2*	0.94	36.2	S2	0.85	41.2	L3*	6.00
1979-1983	2.6	36.1	L2*	0.69	34.9	S2	0.49	35.2	L3*	1.31
1980-1984	0.5	33.1	L2*	0.78	32.6	S2	1.04	32.7	S2*	0.95
1981-1985	0.0	30.8	L2*	0.74	31.1	S2	1.08	31.4	S2*	1.19
1982-1986	0.0	29.3	L2*	0.78	30.0	S1.5	0.77	30.4	S2	1.00
1983-1987	0.0	26.9	L2*	0.83	27.9	S1.5	0.71	28.3	S1.5	1.01
1984-1988	0.0	25.1	L1.5*	1.01	25.8	S1	0.90	26.1	S1	1.01
1985-1989	0.0	25.2	L2*	1.04	25.9	S1*	1.14	26.3	S1*	0.74
1986-1990	0.0	25.3	L1.5*	0.96	25.7	L2*	1.31	26.4	L2*	0.88
1987-1991	0.0	23.2	L1.5*	0.75	22.8	L1.5*	0.62	24.2	L2*	1.45
1988-1992	0.2	23.9	L1.5*	0.48	23.7	L1.5*	1.00	26.1	L1.5*	3.47
1989-1993	2.6	25.6	L1.5*	0.58	26.2	L1.5*	1.89	30.3	L1.5*	6.13
1990-1994	7.4	26.9	L1.5*	0.58	28.8	L1.5*	3.35	33.2	L0.5*	7.77
1991-1995	7.4	28.2	L1.5*	0.60	32.5	L0.5*	5.90	37.4	O3*	8.86
1992-1996	10.4	31.4	L1.5*	0.45	45.4	O4*	8.73	45.2	O4*	8.74
1993-1997	33.2	49.7	L1.5*	0.62	46.7	S1*	1.08	53.0	L2*	4.69
1994-1998	53.7	62.5	L1.5*	0.42	55.4	S1.5	0.86	56.7	S1*	1.30
1995-1999	89.0	72.7	L1.5*	0.54	63.1	S1	0.88	86.6	O3*	8.75
1996-2000	98.9	104.9	L1*	1.13	71.4	S2	0.89	72.0	S1.5	1.10
1997-2001	98.3	190.7	R5*	14.08	84.0	R3*	1.89	177.4	R2.5*	16.56

Schedule F

AQUILA NETWORKS - MPS GAS OPERATIONS

Distribution Plant

Account: 380XXX Services

T-Cut: None

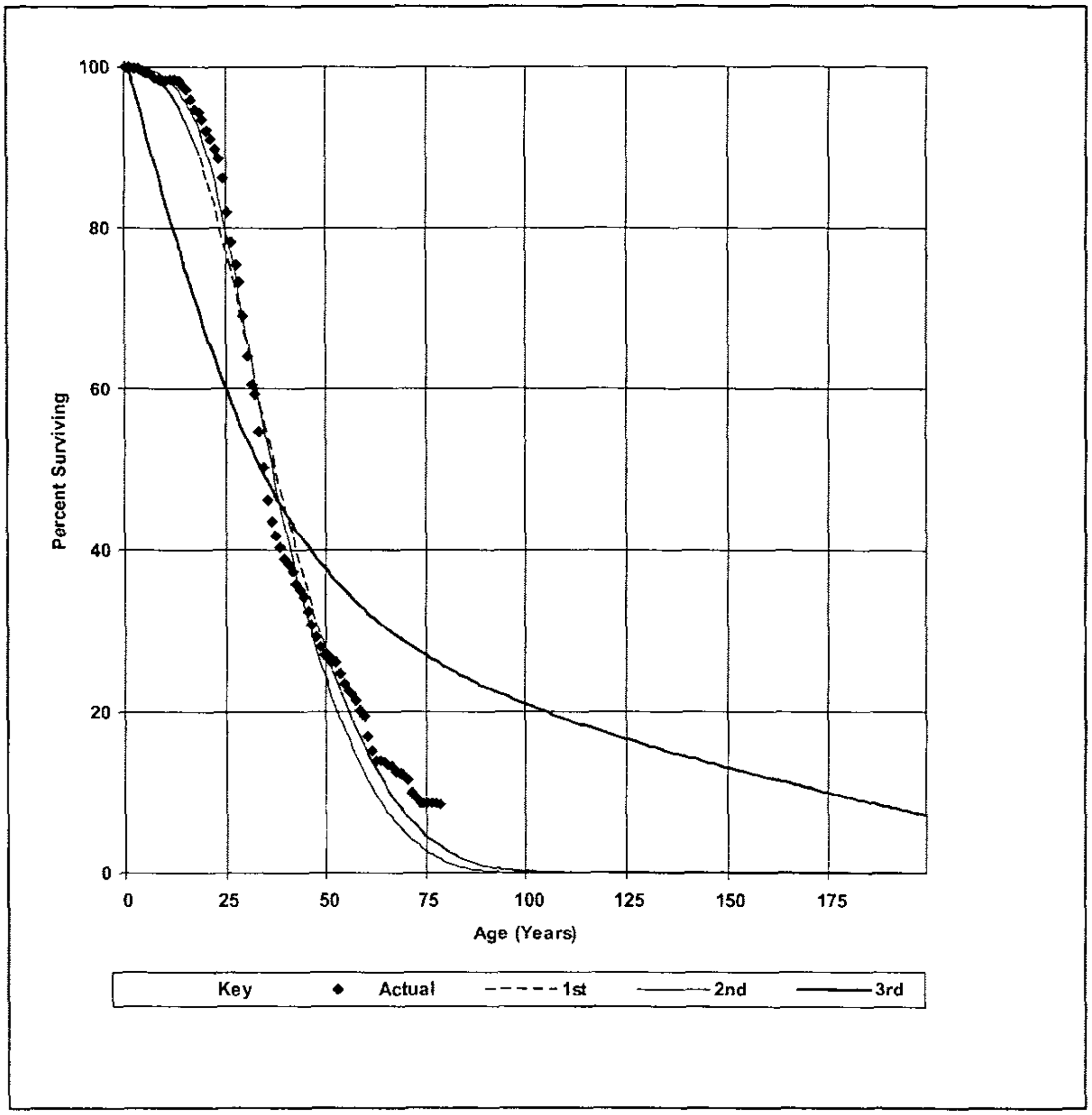
Placement Band: 1924-2001 Observation Band: 1961-2001

Hazard Function: Proportion Retired

Weighting: Exposures

Graphics Analysis

1st: 38.7-L1.5 2nd: 38.1-L2 3rd: 60.4-O4



Schedule F

AQUILA NETWORKS - MPS GAS OPERATIONS

Distribution Plant

Account: 380XXX Services

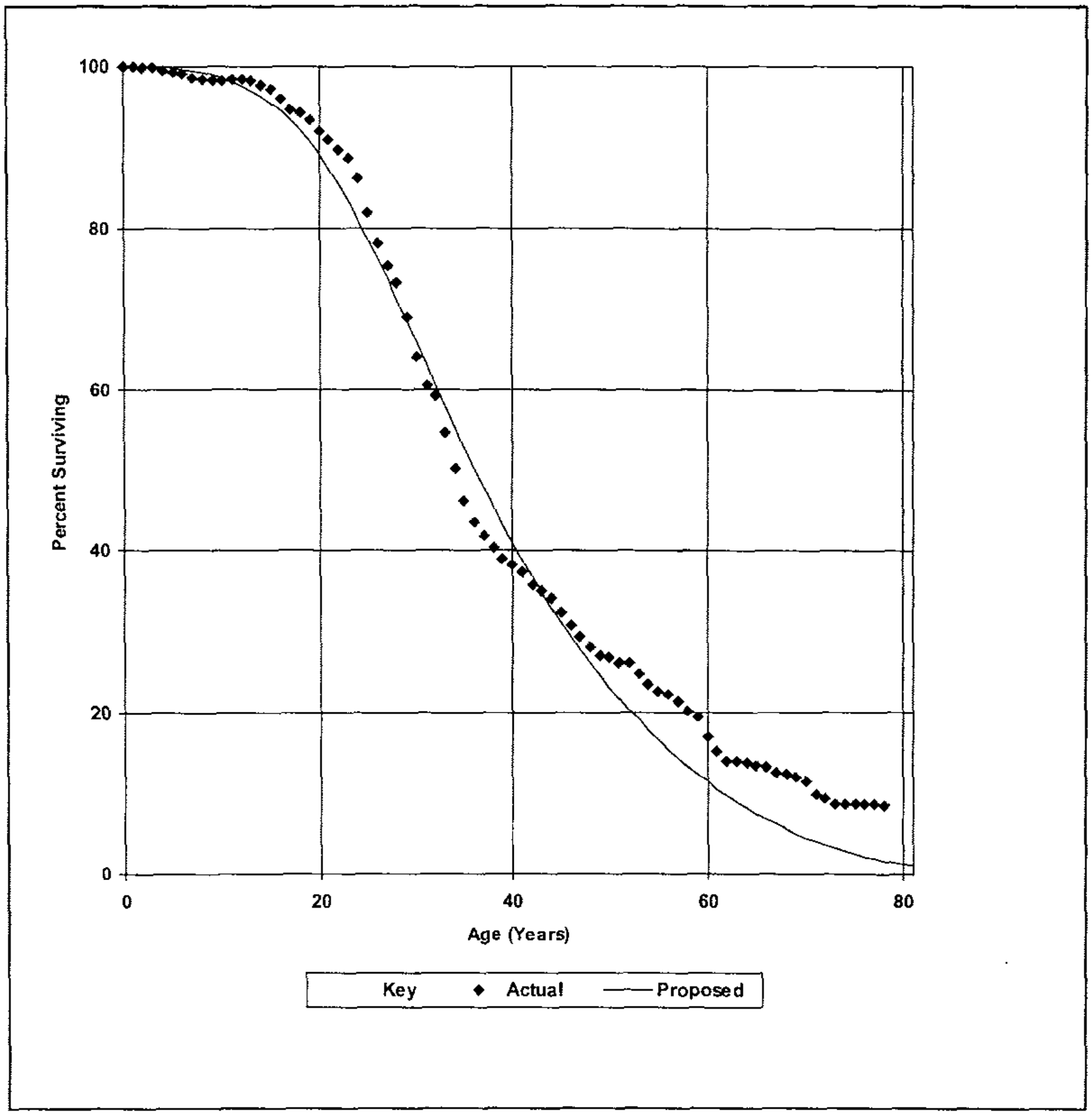
T-Cut: None

Placement Band: 1924-2001

Observation Band: 1961-2001

38.0-L2

Proposed Projection Life Curve



AQUILA NETWORKS - MPS GAS OPERATIONS

Distribution Plant

Account: 380XXX Services

Unadjusted Net Salvage History

		Gross Salvage			Cost of Retiring			Net Salvage		
Year	Retirements	Amount	Pct.	5-Yr Avg.	Amount	Pct.	5-Yr Avg.	Amount	Pct.	5-Yr Avg.
A	B	C	D=C/B	E	F	G=F/B	H	I=C-F	J=I/B	K
1983	149,501	968	0.6		108,429	72.5		(107,461)	-71.9	
1984	218,707	1,262	0.6		122,344	55.9		(121,082)	-55.4	
1985	224,646	304	0.1		127,924	56.9		(127,620)	-56.8	
1986	221,855	684	0.3		215,032	96.9		(214,348)	-96.6	
1987	358,941	508	0.1	0.3	132,069	36.8	60.1	(131,561)	-36.7	-59.8
1988	418,036	2,932	0.7	0.4	166,741	39.9	53.0	(163,809)	-39.2	-52.6
1989	224,249	589	0.3	0.3	151,089	67.4	54.8	(150,500)	-67.1	-54.4
1990	256,277	(7,349)	-2.9	-0.2	171,298	66.8	56.5	(178,647)	-69.7	-56.7
1991	637,706	65	0.0	-0.2	145,141	22.8	40.4	(145,076)	-22.7	-40.6
1992	327,350	301	0.1	-0.2	146,934	44.9	41.9	(146,633)	-44.8	-42.1
1993	190,222	19	0.0	-0.4	125,375	65.9	45.2	(125,356)	-65.9	-45.6
1994	132,065		0.0	-0.5	90,649	68.6	44.0	(90,649)	-68.6	-44.5
1995	189,180		0.0	0.0	85,475	45.2	40.2	(85,475)	-45.2	-40.2
1996	459,378	13	0.0	0.0	106,871	23.3	42.8	(106,858)	-23.3	-42.7
1997	(1,315,489)		0.0	0.0	52,891	-4.0	0.0	(52,891)	4.0	0.0
1998	13,542		0.0	0.0	20,391	150.6	0.0	(20,391)	-150.6	0.0
1999			0.0	0.0		0.0	0.0		0.0	0.0
2000	51,424	86	0.2	0.0	66,101	128.5	0.0	(66,015)	-128.4	0.0
2001	68,362	1,640	2.4	0.0	62,362	91.2	0.0	(60,721)	-88.8	0.0
Total	2,825,952	2,022	0.1		2,097,115	74.2		(2,095,093)	-74.1	

Schedule REW–3

2002 Depreciation Rate Study

Aquila Networks—SJLP
(Gas Operations)

Prepared by
Foster Associates, Inc.

CONTENTS

Distribution

376100 – Mains (Metallic)

EXECUTIVE SUMMARY

INTRODUCTION

This report presents the findings and recommendations developed in a 2002 Depreciation Rate Study for utility plant owned by Aquila Networks – SJLP (Gas Operations). Work on the study, conducted by Foster Associates, Inc., commenced in January 2003 and progressed through mid-March 2003, at which time the project was completed.

Foster Associates, Inc. is a public utility economic consulting firm headquartered in Bethesda, Maryland offering economic research and consulting services on issues and problems arising from governmental regulation of business. The areas of specialization supported by our Fort Myers office include property life forecasting, technological forecasting, depreciation estimation, and valuation of industrial property.

Foster Associates has undertaken numerous depreciation engagements for both public and privately owned corporations including detailed statistical life studies, analyses of required net salvage rates, and the selection of depreciation systems that will most nearly achieve the goals of depreciation accounting under the constraints of either government regulation or competitive market pricing. Foster Associates is widely recognized for industry leadership in the development of depreciation systems, life analysis techniques and computer software for conducting depreciation and valuation studies.

Gas depreciation rates currently used by SJLP were approved by the Missouri Public Service Commission (Commission) pursuant to a Stipulation and Agreement in Formal Case No. ER-99-246 dated August 17, 1999. Net salvage rates and service life statistics used to derive the settled depreciation rates were not included in either the Stipulation and Agreement or in other documents related to the case.

The principal findings and recommendations of the SJLP Depreciation Rate Study are summarized in the Statements section of this report. Statement A provides a comparative summary of present and proposed annual depreciation rates for each rate category. Statement B provides a comparison of present and proposed annual depreciation accruals. Statement C provides a comparison of the computed, recorded and redistributed depreciation reserves for each rate category. Statement D provides a summary of the components used to obtain a weighted-average net salvage rate for each plant account. Statement F provides a comparative summary of present and proposed parameters including projection life, projection curve, average service life, and average remaining life.

Scope of Study

The principal activities undertaken in the current study included:

- Collection of plant and net salvage data;
- Reconciliation of data to the official records of the Company;
- Discussions with Aquila plant accounting personnel;
- Estimation of projection lives and retirement dispersion patterns;
- Analysis of gross salvage and removal expense;
- Analysis and redistribution of recorded depreciation reserves; and
- Development of recommended accrual rates for each rate category.

Depreciation System

A depreciation rate is formed by combining the elements of a depreciation system. A depreciation system is composed of a method, a procedure and a technique. A depreciation method (*e.g.*, straight-line) describes the component of the system that determines the acceleration or deceleration of depreciation accruals in relation to either time or use. A depreciation procedure (*e.g.*, vintage group) identifies the level of grouping or sub-grouping of assets within a plant category. The level of grouping specifies the weighting used to obtain composite life statistics for an account. A depreciation technique (*e.g.*, remaining-life) describes the life statistic used in the system.

SJLP is presently using a depreciation system composed of the straight-line method, broad group procedure, whole-life technique for all plant categories. Depreciation rates proposed in this study are derived from a system composed of the straight-line method, vintage group procedure, whole-life technique with amortization of reserve imbalances over the estimated remaining life of each rate category. This formulation of the accrual rate is equivalent to a straight-line method, vintage group procedure, remaining-life technique.

The matching and expense recognition principles of accounting provide that the cost of an asset (or group of assets) should be allocated to operations over an estimate of the economic life of the asset in proportion to the consumption of service potential. It is the opinion of Foster Associates that the objectives of depreciation accounting can be more nearly achieved using the vintage-group procedure combined with the remaining-life technique. Unlike the broad group procedure in which each vintage is estimated to have the same average service life, the vintage group procedure distinguishes average service lives among vintages and provides cost apportionment over the estimated weighted-average remaining life or average life of a rate category.

The level of asset grouping identified in the broad group procedure is the total plant in service from all vintages in an account. Each vintage is estimated to have the same average service life. It is highly unlikely, therefore, that compensating deviations (*i.e.*, over and underestimates of average service life) will be created among vintages to achieve cost allocation over the average service life of each vintage. The level of asset grouping identified in the vintage group procedure is the plant in service from each vintage. The average service life (or remaining life) is estimated for each vintage and composite life statistics are computed for each plant account. It is more likely, therefore, that compensating deviations will be created with a vintage group procedure than with a broad group procedure.

The dependency of both the broad group procedure and the vintage group procedure on compensating deviations in the estimate of service lives is attributable to the use of the whole-life technique. A permanent excess or deficiency will be created in the depreciation reserve by a continued application of the whole-life technique if these deviations are not exactly offsetting. The potential for a permanent reserve imbalance can be eliminated, however, by an application of the remaining-life technique.

The principal distinction between a whole-life rate and a remaining-life rate is the treatment of depreciation reserve imbalances caused largely by imprecise estimates of service life statistics and net salvage rates. A reserve imbalance is the difference between a theoretical or computed reserve and the corresponding recorded reserve for a rate category.

Although the emergence of economic factors such as bypass and incentive forms of regulation may ultimately encourage abandonment of the straight-line method, no attempt was made in the current study to address these concerns.

Proposed Depreciation Rates

Table 1 provides a summary of the changes in annual rates and accruals resulting from adoption of the parameters and depreciation system recommended in this study.

Rates and Accruals

Function	Accrual Rate			2002 Annualized Accrual		
	Present	Proposed	Difference	Present	Proposed	Difference
Distribution	2.24%	3.55%	1.31%	$167,092	$265,617	$98,525
General Plant	2.60%	3.49%	0.89%	4,125	5,544	1,419
Total Utility	2.24%	3.55%	1.31%	$171,217	$271,161	$99,944

TABLE 1. PRESENT AND PROPOSED RATES AND ACCRUALS

Foster Associates is recommending primary account depreciation rates equivalent to a composite rate of 3.55 percent. Depreciation expense is presently accrued at an equivalent composite rate of 2.24 percent. The recommended change in the composite depreciation rate is, therefore, an increase of 1.31 percentage points.

A continued application of rates currently prescribed would provide annualized depreciation expense of $171,217 compared to an annualized expense of $271,161 using the rates developed in this study. The proposed expense increase is $99,944. Of this increase, $27,623 represents amortization of a $684,756 reserve imbalance. The remaining portion of the increase is attributable to recommended changes in service life and net salvage parameters.

Of the 17 primary accounts included in the 2002 study, Foster Associates is recommending rate reductions for 6 accounts and rate increases for 11 accounts.

EDURE

depreciation study is to analyze the mortality characteris- and adequacy of the depreciation accrual and recorded de- each rate category. This study provides the foundation and commended changes in the depreciation accrual rates used P Gas Operations. The proposed rates are subject to approval Service Commission.

ed in conducting a depreciation study can be grouped into

- ction;
- is and Estimation;
- Analysis;
- Reserve Analysis; and
- t of Accrual Rates.

2002 study for SJLP included a consideration of each of d below.

atabase required to conduct a statistical life study consists of year additions and unaged activity year retirements, transfers se data must be appropriately adjusted for transfers, sales ity that would otherwise bias the measured service life of The age distribution of surviving plant for unaged data can be ing the plant in service at the beginning of the study year to portion to the theoretical amount surviving from a projection tified in the life study. The statistical methods of life analy- aged plant data are known as *semi-actuarial techniques*.

sive database is required to apply the statistical methods of as *actuarial techniques*. Plant data used in an actuarial life ude the age distribution of surviving plant at the beginning the vintage year, activity year, and dollar amounts associ- tirements, reimbursed retirements, sales, abnormal retire- ctions, and extraordinary adjustments over a series of prior arial database may include the age distribution of surviving of the earliest activity year, rather than at the beginning of additions; however, must be included in a database contain- istribution to derive aged survivors at the beginning of the study year. All activity year transactions with vintage year identification are coded and stored in a data file. The data are processed by a computer program and transaction summary reports are created in a format reconcilable to the Company's official plant records. The availability of such detailed information is dependent upon an accounting system that supports aged property records. The Continuing Property Record (CPR) system used by Aquila for SJLP assets provides aged transactions for all plant accounts.

The database used in the 2002 study was compiled from two sources. Detailed accounting transactions were extracted from these sources and assigned transaction codes which identify the nature of the accounting activity. Transaction codes for plant additions, for example, are used to distinguish normal additions from acquisitions, purchases, reimbursements and adjustments. Similar transaction codes are used to distinguish normal retirements from sales, reimbursements, abnormal retirements and adjustments. Transaction codes are also assigned to transfers, capital leases and other accounting activity which should be considered in a depreciation study.

The first data source was an electronic file used by SJLP in conducting its 1998 depreciation rate study. The legacy data base was updated by SJLP to include activity years 1998 through 2000. The earliest activity year in the updated file was 1980. An electronic worksheet was used by Foster Associates to create a coded database in a format compatible with the software used to conduct the current depreciation study.

The second source of data was the current CPR system installed by Aquila in 1998. The database obtained from this system included activity year transactions for calendar year 2001 and the age distribution of surviving plant at December 31, 2001. Plant transactions for 2001 were added to the legacy database to generate age distributions at December 31, 2001. The resulting age distributions were then compared to the age distributions extracted from the current CPR. Differences were coded as vintage adjustments in 2001 to interconnect and provide continuity between the two databases. Care was taken in creating the Foster Associates database to ensure a proper mapping of the legacy system account structure to the current CPR account structure.

The accuracy and completeness of the assembled data base was verified by Foster Associates for activity year 2001 by comparing additions, retirements, transfers and adjustments, and the ending plant balance derived for 2001 to the official plant records of the Company. The legacy database contains adjustments for depreciation study purposes which prevents reconciling the database to the official plant records for activity years prior to 2001.

Life Analysis and Estimation

Life analysis and life estimation are terms used to describe a two-step procedure for estimating the mortality characteristics of a plant category. The first step (*i.e.*, life analysis) is largely mechanical and primarily concerned with history. Statistical techniques are used in this step to obtain a mathematical description of the forces of retirement acting upon a plant category and an estimate of service life known as the *projection life* of the account. The mathematical expressions used to describe these life characteristics are known as *survival functions* or *survivor curves*.

The second step (*i.e.*, life estimation) is concerned with predicting the expected remaining life of property units still exposed to the forces of retirement. It is a process of blending the results of the life analysis with informed judgment (including expectations about the future) to obtain an appropriate projection life and curve. The amount of weight given to the life analysis will depend upon the extent to which past retirement experience is considered descriptive of the future.

The analytical methods used in a life analysis are broadly classified as actuarial and semi-actuarial techniques. Actuarial techniques can be applied to plant accounting records that reveal the age of a plant asset at the time of its retirement from service. Stated differently, each property unit must be identifiable by date of installation and age at retirement. Semi-actuarial techniques can be used to derive service life and dispersion estimates when age identification of retirements is not maintained or readily available.

An actuarial life analysis program designed and developed by Foster Associates was used in this study. The first step in an actuarial analysis involves a systematic treatment of the available data for the purpose of constructing an observed life table. A complete life table contains the life history of a group of property units installed during the same accounting period and various probability relationships derived from the data. A life table is arranged by age-intervals (usually defined as one year) and shows the number of units (or dollars) entering and leaving each age-interval and probability relationships associated with this activity. A life table minimally shows the age of each survivor and the age of each retirement from a group of units installed in a given accounting year.

A life table can be constructed in any one of at least five alternative methods. The annual-rate or retirement-rate method was used in this study. The mechanics of the annual-rate method require the calculation of a series of ratios obtained by dividing the number of units (or dollars) surviving at the beginning of an age interval into the number of units (or dollars) retired during the same interval. This ratio (or set of ratios) is commonly referred to as retirement ratios. The cumulative proportion surviving is obtained by multiplying the retirement ratio for each age interval by the proportion of the original group surviving at the beginning of that age interval and subtracting this product from the proportion surviving at the beginning of the same interval. The annual-rate method is applied to multiple groups or vintages by combining the retirements and/or survivors of like ages for each vintage included in the analysis.

The second step in an actuarial analysis involves graduating or smoothing the observed life table and fitting the smoothed series to a family of survival functions. The functions used in this study are the Iowa-type curves which are mathematically described in terms of the Pearson frequency curve family. The observed life table was smoothed by a weighted least-squares procedure in which first, second and third degree polynomials were fitted to the observed retirement ratios. The resulting function can be expressed in terms of a survivorship function which is numerically integrated to obtain an estimate of the average service life. The smoothed survivorship function is then fitted by a weighted least-squares procedure to the Iowa-curve family to obtain a mathematical description or classification of the dispersion characteristics of the data.

The set of computer programs used in this analysis provides multiple rolling-band and shrinking-band analyses of an account. Observation bands are defined for a "retirement era" which restricts the analysis to the retirement activity of all vintages represented by survivors at the beginning of a selected era. In a rolling-band analysis, a year of retirement experience is added to each successive retirement band and the earliest year from the preceding band is dropped. A shrinking-band analysis begins with the total retirement experience available and the earliest year from the preceding band is dropped for each successive band. Rolling and shrinking band analyses are used to detect the emergence of trends in the behavior of the dispersion and average service life.

Options available in the actuarial life analysis program include the width and location of both placement and observation bands; the interval of years included in a selected rolling or shrinking band analysis; the estimator of the hazard rate (actuarial, conditional proportion retired, or maximum likelihood); the elements to include on the diagonal of a weight matrix (exposures, inverse of age, inverse of variance, or unweighted); and the age at which an observed life table is truncated. The program also provides tabular and graphics output as an aid in the analysis and optionally produces data output files used in the calculation of depreciation accruals.

While actuarial and semi-actuarial statistical methods are well suited to an analysis of plant categories containing a large number of homogeneous units (*e.g.*, mains and services), the concept of retirement dispersion is inappropriate for plant categories composed of major items of plant that will most likely be retired as a single unit. Plant retirements from an integrated system prior to the retirement of the entire facility are more properly viewed as interim retirements that will be replaced in order to maintain the integrity of the system. Additionally, plant facilities may be added to the existing system (*i.e.*, interim additions) in order to expand or enhance its productive capacity without extending the service life of the present system. A proper depreciation rate can be developed for an integrated system using a life-span method. All plant accounts were treated as full mortality categories in this study.

Net Salvage Analysis

Depreciation rates designed to achieve the goals and objectives of depreciation accounting will include a parameter for future net salvage and a variable for average net salvage which reflects both realized and future net salvage rates.

An estimate of the net salvage rate applicable to future retirements is most often obtained from an analysis of gross salvage and removal expense realized in the past. An analysis of past experience (including an examination of trends over time) provides an appropriate basis for estimating future salvage and cost of removal. However, consideration should also be given to events that may cause deviations from net salvage realized in the past. Among the factors that should be considered are the age of plant retirements; the portion of retirements likely to be reused; changes in the method of removing plant; the type of plant to be retired in the future; inflation expectations; the shape of the projection life curve; and economic conditions that may warrant greater or lesser weight to be given to the net salvage observed in the past.

Special consideration should also be given to the treatment of insurance proceeds and other forms of third-party reimbursements credited to the depreciation reserve. A properly conducted net salvage study will exclude such activity from the estimate of future parameters and include the activity in the computation of realized and average net salvage rates.

A traditional, historical analysis using a five-year moving average of the ratio of realized salvage and removal expense to the associated retirements was used in this study to a) estimate a realized net salvage rate; b) detect the emergence of historical trends; and c) establish a basis for estimating a future net salvage rate. Cost of removal and salvage opinions obtained from Company engineers were blended with judgment and historical net salvage indications in developing estimates of the future.

The average net salvage rate for an account was estimated using direct dollar weighting of historical retirements with the historical net salvage rate, and future retirements (*i.e.*, surviving plant) with the estimated future net salvage rate. The computation of the estimated average net salvage rate for each rate category is shown in Statement D.

Depreciation Reserve Analysis

The purpose of a depreciation reserve analysis is to compare the current level of the recorded reserve with the level required to achieve the goals or objectives of depreciation accounting if the amount and timing of future retirements and net salvage are realized as predicted. The difference between the required depreciation reserve and the recorded reserve provides a measurement of the expected excess or shortfall that will remain in the depreciation reserve if corrective action is not taken to eliminate the reserve imbalance.

Unlike a recorded reserve which represents the net amount of depreciation expense charged to previous periods of operations, a theoretical reserve is a measure of the implied reserve requirement at the beginning of a study year if the timing of future retirements and net salvage is in exact conformance with a survivor curve chosen to predict the probable life of plant units still exposed to the forces of retirement. Stated differently, a theoretical depreciation reserve is the difference between the recorded cost of plant presently in service and the sum of the depreciation expense and net salvage that will be charged in the future if plant retirements are distributed over time according to a specified retirement frequency distribution.

The survivor curve used in the calculation of a theoretical depreciation reserve is intended to describe forces of retirement that will be operative in the future. However, retirements caused by forces such as accidents, physical deterioration and changing technology seldom, if ever, remain stable over time. It is unlikely, therefore, that a probability or retirement frequency distribution can be identified that will accurately describe the age of plant retirements over the complete life cycle of a vintage. It is for this reason that depreciation rates should be reviewed periodically and adjusted for observed or expected changes in the parameters chosen to describe the underlying forces of mortality.

Although reserve records are commonly maintained by various account classifications, the total reserve for a company is the most important measure of the status of the company's depreciation practices. If statistical life studies have not been conducted or retirement dispersion has been ignored in setting depreciation rates, it is likely that some accounts will be over-depreciated and other accounts will be under-depreciated relative to a calculated theoretical reserve. Differences between the theoretical reserve and the recorded reserve also will arise as a normal occurrence when service lives, dispersion patterns and net salvage estimates are adjusted in the course of depreciation reviews. It is appropriate, therefore, and consistent with group depreciation theory to periodically redistribute or rebalance the total recorded reserve among the various primary accounts based upon the most recent estimates of retirement dispersion and net salvage rates.

A redistribution of recorded reserves is appropriate for SJLP at this time. Although recorded reserves have been maintained by primary account, these reserves were largely ignored in the development of the presently prescribed whole-life accrual rates. The present rates were established by negotiations and compromise without specifying the parameters and reserve ratios contemplated in the settled rates. This failure to address prior reserve imbalances produces an added dimension of instability in accrual rates beyond the variability attributable to the parameters estimated in the current study. A redistribution of the recorded reserve is necessary, therefore, to develop an initial reserve balance for each primary account consistent with the age distributions and estimates of retirement dispersion developed in this study. Reserves should also be realigned in this study to reflect implementation of the vintage group procedure.

A redistribution of the recorded reserve was achieved for SJLP by multiplying the calculated reserve for each primary account within a function by the ratio of the function total recorded reserve to the function total calculated reserve. The sum of the redistributed reserves within a function is, therefore, equal to the function total recorded depreciation reserve before the redistribution.

Statement C provides a comparison of the computed and recorded reserves for SJLP on December 31, 2001. The recorded reserve was $3,483,626, or 45.6 percent of the depreciable plant investment. The corresponding computed reserve is $4,168,382 or 54.6 percent of the depreciable plant investment. A proportionate amount of the measured reserve imbalance of $684,756 will be amortized over the composite weighted-average remaining life of each rate.

Development of Accrual Rates

The goal or objective of depreciation accounting is cost allocation over the economic life of an asset in proportion to the consumption of service potential. Ideally, the cost of an asset—which represents the cost of obtaining a bundle of service units—should be allocated to future periods of operation in proportion to the amount of service potential expended during an accounting interval. The service potential of an asset is the present value of future net revenue (*i.e.*, revenue less expenses exclusive of depreciation and other non-cash expenses) or cash inflows attributable to the use of that asset alone.

Cost allocation in proportion to the consumption of service potential is often approximated by the use of depreciation methods employing time rather than net revenue as the apportionment base. Examples of time-based methods include sinking-fund, straight-line, declining balance, and sum-of-the-years' digits. The advantage of using a time-based method is that it does not require an estimate of the remaining amount of service capacity an asset will provide or the amount of capacity actually consumed during an accounting interval. Using a time-based allocation method, however, does not change the goal of depreciation accounting. If