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APPLICATION OF MONARCH UTILITIES I, L.P. TO CHANGE RATES FOR WATER AND SEWER SERVICE	§ § §	BEFORE THE STATE OFFICE OF ADMINISTRATIVE HEARINGS

REBUTTAL TESTIMONY

OF

EARL M. ROBINSON

ON BEHALF OF

MONARCH UTILITIES I, L.P.

AUGUST 31, 2016

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REBUTTAL TESTIMONY OF
EARL M. ROBINSON

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APPLICATION OF MONARCH UTILITIES I, L.P. TO CHANGE RATES FOR WATER AND SEWER SERVICE	**§ § §**	**BEFORE THE STATE OFFICE OF ADMINISTRATIVE HEARINGS**

REBUTTAL TESTIMONY OF EARL M. ROBINSON

I. INTRODUCTION

Q. PLEASE STATE YOUR NAME, OCCUPATION AND BUSINESS ADDRESS.

A. My name is Earl M. Robinson. I am a Principal of AUS Consultants. AUS Consultants is a consulting firm specializing in preparing various financial studies including depreciation, valuation, revenue requirements, cost of service, rate of return, and other analysis and studies for the utility industry and numerous other entities. AUS Consultants provides a wide spectrum of consulting services through its practices that include Depreciation & Valuation, Rate of Return, Revenue Requirements & Cost of Service, and Education & Publications. My office is located at 792 Old Highway 66, Suite 200, Tijeras, New Mexico 87059.

Q. DID YOU FILE DIRECT TESTIMONY IN THIS CASE?

A. Yes, I filed direct testimony on behalf of Monarch Utilities I, L.P. (Monarch).

Q. PLEASE DESCRIBE THE PURPOSE OF YOUR REBUTTAL TESTIMONY.

A. In my rebuttal testimony, I address two Public Utility Commission (Commission) Staff witnesses, Ms. Heidi Graham and Ms. Jolie Mathis. Both witnesses presented testimony concerning Monarch's proposed plant depreciation, Schedules II-1.4W and II-1.4S of Monarch's rate application, both of which I sponsor, as well as my

supporting direct testimony concerning depreciation. Ms. Graham, with a few exceptions, relied heavily on the depreciation testimony and exhibits of Ms. Mathis.

Accordingly, I will address the few positions/statements of Ms. Graham followed by my rebuttal to Ms. Mathis' testimony and exhibits.

II. REBUTTAL TO STAFF WITNESS GRAHAM

Q. WHAT IS MS. GRAHAM'S DEPRECIATION POSITION AND YOUR RESPONSE?

A. On page 5, lines 2-4 of her testimony, Ms. Graham states, "I built the schedule [HG-4 a straight line (unit) method depreciation schedule] because the depreciation study included in the application for group depreciation purposes was determined to be unreliable, as reflected in Ms. Jolie Mathis' testimony. Absent a proper depreciation study, the straight-line (unit) method should be used."

Ms. Graham's statement that Monarch's filed depreciation studies are unreliable is incorrect. My rebuttal testimony will demonstrate that the depreciation studies filed as Schedules II-1.4W and II-1.4S are comprehensive, complete, and fully support the proposed average service lives, net salvage percentages, and resulting depreciation rates.

Ms. Graham made the above statement, notwithstanding the reference made on page 7 of Ms. Mathis' testimony to Texas Senate Bill 2306:

> Senate Bill (SB) 2306, 81st Legislate [sic] Session, 2009, amended Texas Water Code (TWC) 13.131, by ***requiring the Texas Commission on Environmental Quality (TCEQ) by rule to allow*** water and/or sewer utilities to claim the book cost less net salvage of

depreciable utility plant retired be charged in its entirety to the accumulated depreciation account in a manner consistent with accounting treatment of regulated electric and gas utilities in this state. In the past, TCEQ treated bookkeeping entries associated with retirement of assets (net salvage values) as income and expense items rather than in depreciation calculations. This was considered ***itemized accounting (each asset reported separately)*** as supporting documentation for asset depreciation.... The assets are reported as a group (group accounting), instead of itemized accounting. Due to the complexity of a depreciation study associated with group accounting, TCEQ ***continued to allow*** water and or sewer utilities the ***option*** of itemized accounting.[1]

As set out above, SB 2306 requires the TCEQ/Commission to allow water and wastewater companies to use group depreciation in the same way that electric and gas companies use the depreciation approach. Monarch is proposing to use group-based depreciation rates for a variety of reasons, not the least of which is the efficiency that can be gained in the application of depreciation rates, future true-ups of such depreciation rates, as well as maintenance of depreciation records. Additional discussion of items related to group- versus unit-based depreciation will be included in my rebuttal to Ms. Mathis.

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[1] Direct Testimony of Jolie Mathis at 7, line 9-22 (emphasis added).

Q. DID MS. GRAHAM STATE THAT THE COMPANY FAILED TO USE AN ENGINEER'S ESTIMATE TO DETERMINE COST OF REMOVAL AND SALVAGE ESTIMATES?

A. Yes. On page 12 of her testimony, Ms. Graham stated, "Monarch did not use an engineer's estimate to determine the cost of removal and salvage value of their plant assets"[2] and supported her statement by stating "TCEQ rules require that all water and sewer plant construction be submitted by an engineer licensed in the State of Texas."[3] Ms. Graham's statement references "plant construction." No plant construction was performed in the financial (depreciation study) of Monarch's plant in service. Furthermore, Ms. Graham has not produced, nor can she produce, such a requirement for the completion of depreciation studies for the financial rate regulation proceeding.

Q. WHAT IS YOUR RESPONSE TO HER STATEMENT THAT YOU ARE NOT QUALIFIED TO PERFORM THE DEPRECIATION STUDIES FILED IN THIS PROCEEDING?

A. On page 13, Ms. Graham claims, "Mr. Robinson does not have the education or practical experience to determine the cost of removal and salvage values for Monarch's assets."[4] My professional experience speaks for itself.[5] I have more than forty years of experience performing depreciation studies. Prior to becoming a consultant in 1971, I spent five years as an analyst in a property accounting

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[2] *Id.* at 12, lines 4-5.

[3] *Id.* at 13, lines 1-2.

[4] *Id.* at lines 2-3.

[5] *See* Direct Testimony of Earl M. Robinson, Attachment EMR-1.

department maintaining material used, under construction ledgers, inventorying and costing of assets, and similar accounts for a major telephone corporation.

In my early years of consulting service, I routinely performed depreciation study tasks manually without the aid of computer software. This involved manual take offs of actuarial data from continuing property records, summarizing such records into step tables to develop age interval exposures and retirements, and other related tasks. The age interval exposures and retirements were then used to create observed life tables (raw data files) that are plotted together with Iowa or other curve types for the estimation of average service lives. Similar manual tasks were required to summarize retirements, gross salvage, cost of removal, and net salvage amounts and percentages as well as rolling band analysis.

After the introduction of PCs and Windows in the office environment, I was personally responsible and worked directly with a systems analyst to develop custom Windows-based depreciation software for the purpose of completing depreciation life analysis and depreciation rate development, as well as detailed salvage analysis.

In the process of my more than forty years of providing consulting services, I have prepared an extensive quantity of depreciation studies for all types of utility operating companies including water and wastewater utilities.

Regarding my depreciation education, in the early days of my career, I successfully completed most of the offered Depreciation Programs, Inc. depreciation courses. Since the early 1980's, I have been a participating member of the AGA/EEI Accounting Committee, that meets several times a year to research and discuss

depreciation and plant accounting topics. I have made numerous presentations to the committees over the years.

Likewise, I am a founding member and past President of the Society of Depreciation Professionals, an organization whose goal is to provide a forum for exploring depreciation topics and, more importantly, to provide education and certification for depreciation professionals. I was among the first group of depreciation professionals to successfully complete the Certified Depreciation exam, and received my certification designation more than 10 years ago.

More recently, during the past five years, I have been the sole depreciation instructor for a 1 1/2 day long depreciation course presented several times a year by EUCI, a well-known training/educational firm that provides courses across a significant range of topics throughout the U.S.

During my long depreciation career, I have testified and have been accepted as an expert witness in more than 30 jurisdictions throughout the U.S., Canada, and the Caribbean. Currently, I am in the process of completing depreciation studies and/or testifying in depreciation cases in several regulatory jurisdictions.

My experience and qualifications easily speak, and respond, to Ms. Graham's concerns.

I am confident in saying that with regard to engineers that are engaged in designing or constructing water and wastewater systems, few of such individuals have a sufficient depth of knowledge and/or experience to perform a comprehensive depreciation study. Accordingly, such studies are routinely completed by individuals with a knowledge of financial disciplines that are ever present in rate regulation.

Q. WHAT WAS MS. GRAHAM'S TESTIMONY ABOUT THE DEPRECIATION SCHEDULE THAT SHE IS SPONSORING?

A. On page 4 of her testimony, Ms. Graham states, "I used the filing of Monarch's response to OPUC's [RFI] 5-2 ... as a basis to build a straight-line depreciation schedule. See Attachment...HG-4 (CD) for Staff's Depreciation Schedule."[6] This is a unit-based depreciation schedule that is contrary to Monarch's desired use of group-based depreciation rates and is also inconsistent with SB 2306 that directs the Commission to allow water and sewer companies to use group-based depreciation.

Q. WHAT MAKES UNIT-BASED DEPRECIATION RATES AN UNDESIRABLE METHOD/APPROACH?

A. The preparation of a depreciation study based upon individual Unit Lives is very cumbersome and time consuming, and is based to a large degree simply on professional judgment. Typically, such schedules incorporate no empirical studies of actual company experience. More times than not it is simply someone's estimate of what period of time the property might remain in service. This can be attested to by the fact that within Ms. Graham's Attachment HG-4 there are a variety/range of lives for different assets within the same property group, notwithstanding the fact that per Ms. Mathis' Attachment JM-2, which is a schedule of Commission-approved service lives effective April 9, 2010, there is only one approved service life for each listed property group.

It is highly probable that any service life estimate for a specific line item unit will be incorrect. That is, if one were to estimate a 46-year life for an individual well

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[6] *Id.* at 4, lines 20-23.

location, it unlikely that the specific well will live exactly 46 years—the estimated life. The benefit of estimating an average service life, under a group method, for a "property group" is that it affords an opportunity for the "average" estimate to be closer to correct. If there is a difference between the "property group" life estimate and what is achieved by the company, the group method together with the average remaining life technique provides a mechanism to true-up depreciation rates on a going-forward basis. Conversely, the individual unit depreciation procedure affords no such opportunity because each individual unit stands on its own and has no other property with which to average its recovery. The bottom line is that individual unit depreciation has a high degree of errors that will occur within life estimation, with no systemic process to true-up the life estimate in future years—resulting in the loss due to early retirements simply and inappropriately being charged as a loss to the utility.

Another significant issue under the individual unit depreciation, results from the fact that there are different service lives assigned to property within the same property group. When new property is constructed, it is somewhat of a guessing game as to what life should be assigned to the new property unit. This circumstance presents an opportunity for perpetual errors within a company's depreciation calculation schedule.

The individual unit method of depreciation is an arcane approach to depreciation, is cumbersome to maintain and calculate depreciation, and has long outlived its usefulness. In today's world, the individual unit method of depreciation simply should not be used for utility operating companies with property units numbering in the thousands or greater.

III. REBUTTAL TO STAFF WITNESS MATHIS

Q. MS. GRAHAM STATES THAT SHE RELIED ON MS. MATHIS' DEPRECIATION RECOMMENDATION. WHAT IS YOUR INITIAL RESPONSE?

A. From a review of Ms. Mathis' testimony, it appears that Ms. Graham performed nothing more than a simple review of Ms. Mathis' testimony and exhibits. The Staff requested, and Monarch provided, the company's entire depreciation database. Given the statement made in Ms. Graham's testimony, it is questionable as to how much research or how much understanding that she has with regard to the supplied historical data.

While Ms. Graham stated that Ms. Mathis was an engineer, and Ms. Mathis equally highlighted that she was an engineering graduate, her testimony regarding depreciation procedures, the depreciation study process, and interpretation of study results suggests more of a lack of understanding and knowledge of depreciation than her touted expertise suggests. For example, on page 5 of her testimony, when discussing depreciation procedures Ms. Mathis lists the Broad Group Procedure, the Vintage Group Procedure, and the Equal Life Group Procedure, but no mention was made of the Individual Unit Procedure (the procedure that both Ms. Graham and Ms. Mathis are proposing to foist on the Company notwithstanding SB 2306's requiring water utilities' allowance to use group depreciation).

Next, on page 6, lines 20-21 of her testimony, Ms. Mathis, speaking of the Broad Group Procedure, states: "It is a procedure that requires at least accounting records of annual additions and balances." This is an incorrect statement. The Broad

Group Procedure is a depreciation rate development process and not a life analysis method. Even under the life analysis method task, the Retirement Rate (actuarial) Method used in Schedules II-1.4W and II-1.4S require aged survivor and aged retirements. Only the Simulated Plant Record Method requirements are limited to annual additions and balances. The two discussed areas of depreciation are basic concepts that a depreciation professional involved in completing or reviewing depreciation should have intimate knowledge of.

Next, in again discussing the Broad Group Procedure, Ms. Mathis states on page 6, line 21, that "Retirements by vintage are desirable." Again, this statement is incorrect. The Broad Group Procedure only requires surviving assets by vintage to calculate average remaining life (ARL), if the ARL technique is being used. Retirements by vintage is not a function of the Broad Group Procedure, but is a necessity when using the Retirement Rate Analysis Method (to arrive at an average service life indication), which is the life analysis process, as opposed to the depreciation rate development tasks.

Lastly, in Ms. Mathis' continuous paragraph about the Broad Group Procedure, she states on line 21: "This is a procedure that is widely used in the electric and gas industry, but not as common in the water industry." Again, this statement is absolutely wrong. In essentially every water and wastewater depreciation study that I have completed in my career, the depreciation calculations have been performed using the Broad Group Procedure to either develop the average remaining life under the ARL technique, or during years much earlier in my career to develop depreciation rates under the Whole Life Technique. Ms. Mathis is either

misinformed about the Broad Group Procedure, or has mis-interpreted available study data, or both.

It further appears that Ms. Graham and/or Ms. Mathis simply completed a clerical take-off of the Monarch-supplied asset listing, and performed little or no other depreciation analysis or calculations.

Q. WHAT ARE THE COMMISSION RULES REGARDING TEXAS WATER CODE PROVISIONS THAT APPLY TO GROUP ACCOUNTING?

A. The Commission's rule on depreciation, found at 16 Tex. Admin. Code § 24.31(b)(1)(B) and 24.31(c)(2)(B)(iii), provides directions for utilities practicing group accounting with regard to depreciation expense and reserve for depreciation, respectively. The position taken by Ms. Mathis and Ms. Graham flies in the face of both SB 2306 (now found at Texas Water Code § 13.131(b)), and the Commission's rule. In addition, Monarch has an aggregate group investment of more than $136 million investment in plant in service. The group accounting depreciation practice is far better suited to Monarch with its thousands of units of property, and benefits both Monarch and its ratepayers.

Q. ARE THERE ANY ADDITIONAL ISSUES OR CONCERNS THAT MS. MATHIS RAISES ABOUT THE USE OF GROUP DEPRECIATION OF WATER AND SEWER ASSETS?

A. At the bottom of page 7 (lines 20-22) of her testimony, Ms. Mathis states "Due to the complexity of a depreciation study associated with group accounting, TCEQ continued to allow water and or sewer utilities the option of itemized accounting." Two items stand out in Ms. Mathis' testimony. First, the testimony is that TCEQ

"continued to allow water and or sewer utilities the option of itemized accounting." Monarch has chosen not to continue with itemized accounting, but instead has elected to use group accounting. Staff, in its testimony, is seeking to require Monarch to use itemized accounting. The second item is a reference to the "complexity of a depreciation study" in Ms. Mathis' argument for the Staff's proposed use of itemized accounting. To one who understands the process included in the analysis of historical data and application of the estimated depreciation parameter in arriving at proposed depreciation rates, group accounting is not all that complex—it simply requires a desire to understand the processes.

Q. WHAT DOES MS. MATHIS CONTEND IS A REQUIREMENT TO BE ABLE TO USE GROUP DEPRECIATION?

A. On page 8, line 1, of her testimony Ms. Mathis states: "Historical data. Data is an absolute necessity for the estimation of depreciation." However, Ms. Mathis' statement is not an absolute truth.

Historical plant in service by vintage is necessary. Retirement data is clearly desirable but not an absolute necessity for estimating depreciation lives and salvage percentages. There are a variety of circumstances that require the development of a depreciation rate for which there cannot be any data. One obvious such circumstance is where a new class of property is constructed, or an existing property group investment characteristic is significantly altered due to large new additions, whose investment mixture is possibly different from what is currently in the property group investment. Property groups/asset accounts are intended to be somewhat homogenous properties of similar type, kind, and functions of use, but the group's

contents can vary over time. In the circumstance where there is a new class of property or where there is substantial new investment, it is impossible for Monarch to have any retirement experience, but still a life estimate must be determined for the property group. Under such a scenario, industry data is routinely considered in estimating an average service life. Industry data can be a valid/valuable source for life and salvage estimates if the subject company's property does not have sufficient for study.

Notwithstanding the example offered above, Monarch does have aged data to perform any and all depreciation calculations.

Q. WHAT ADDITIONAL STATEMENTS DOES MS. MATHIS MAKE REGARDING SOURCE DATA FOR GROUP DEPRECIATION AND WHAT ARE YOUR COMMENTS?

A. On page 8, lines 1-3, Ms. Mathis goes on to say, "Plant Accounting data is generated by work orders that are recorded in the continuing property records." This is true for any and all methods, procedures, and techniques of depreciation. To be able to depreciate assets, a company must have an investment record of what property is to be depreciated. It is of interest to note that Monarch has a continuing property record list of 8700-plus asset listing of which all are aged property.

Q. WHAT STATEMENT DOES MS. MATHIS MAKE ABOUT WHAT DATA WAS USED TO COMPLETE MONARCH'S DEPRECIATION STUDIES, AND WHAT IS YOUR RESPONSE?

A. On page 9, line 1, of her testimony, Ms. Mathis alleges that "broad and vague when describing the actual data used in the study." Ms. Mathis' assertion is incorrect. In

response to Staff RFI 1-1 the entire historical database containing all surviving asset investments and related retirements was provided to Staff. Ms. Mathis even refers to the data Monarch provided to Staff in her discussion of the depreciation study I performed. And she further quotes my testimony where I described exactly the analyses I performed and the investigation I undertook in my study. (See her testimony at page 9, lines 2-7.) The data I referenced was provided to Staff in response to RFI 1-1.

Likewise, on page 8, line 25 of her testimony, Ms. Mathis questions the statement from my testimony on page 9 line 6 stating that "...aged plant records for Monarch's property is available for a **period of years**." My statement is true and shows up both in the data provide to the Staff in response to RFI 1-1 as well as the life analysis Observed Life Tables and plots contained in Section 5 of each of the submitted depreciation study reports. That is, the "experience (retirement) bands" listed on each of the observed life tables and curve plots for the applicable property accounts list the range of retirement years' data that was available and used for analysis.

Q. MS. MATHIS DISCUSSES A MONARCH DATA RESPONSE THAT SHE CLAIMS IMPLIED THAT MONARCH AND THE INDUSTRY DO NOT HAVE ADEQUATE DATA TO USE GROUP DEPRECIATION. WHAT IS YOUR RESPONSE TO MS. MATHIS' ASSERTION?

A. On page 9, lines 7-13 of her testimony, Ms. Mathis quotes Monarch's response to RFI 1-10 which states, "The Company's provided depreciation studies are not based upon the vintage group approach, an approach that could/would have varying proportion

surviving amounts at each age, dependent upon the level of variation between actual historical experience versus [the] amount generated via the use of the estimated Iowa Curve and average service life under the Broad Group Procedure. The Company does not, and few in the industry do, have **sufficient detailed data** to complete detailed vintage group depreciation calculations." Again, Ms. Mathis demonstrates her lack of knowledge and understanding of the various methods, procedures, and techniques used in performing depreciation study analysis and calculation.

The Vintage Group Procedure is not an analysis process to analyze and estimate average service lives, but is rather a depreciation application process to determine average remaining lives of a company's vintage level plant in service investments. In general, the Vintage Group Procedure uses a company vintage level plant investment together with an estimated Iowa Curve and related average service life along with a company's vintage level detail of additions, retirements, adjustments, etc., to determine the applicable average service life and average remaining life for each individual vintage investment within the applicable property account.

By comparison, the Broad Group Procedure only uses the estimated Iowa Curve and related average service life to define the average service life (which is the estimated life) and the average remaining life of each vintage. The difference between the two procedures, Vintage Group and Broad Group, is that Vintage Group generates potentially different average service lives for each vintage within the property account, while Broad Group uses the estimated average service life for all vintages of property.

Q. DO YOU HAVE ANY INDUSTRY SPECIFIC MATERIALS THAT SUPPORT YOUR EXPLANATION OF DEPRECIATION METHODS, PROCEDURES, AND TECHNIQUES?

A. Included in my rebuttal testimony is Attachment EMR-1R, which is a copy of depreciation text page excerpts from a publication entitled "An Introduction to Depreciation of Public Utility Plant and Plant of Other Industries" that provides a narrative of the depreciation methods, procedures, and techniques used in calculating depreciation rates and expense under the group accounting approach. Page 4 of the document describes the Vintage Group Procedure, while the Broad Group Procedure is discussed on pages 4 and 5 of the document.

Q. WHAT COMMENTS DO YOU HAVE REGARDING MS. MATHIS' STATEMENT THAT YOU ALL BUT ADMIT THE INDUSTRY DOES NOT HAVE SUFFICIENT INFORMATION FOR GROUP DEPRECIATION?

A. Ms. Mathis' statement is incorrect and underscores her lack of understanding of the depreciation study process.

Q. DO YOU HAVE DATA SETS THAT LIST THE AMOUNT OF MONARCH PROPERTY INVESTMENT FOR WHICH SERVICE LIVES WERE PRINCIPALLY BASED UPON ANALYSIS OF ACTUAL COMPANY DATA AS OPPOSED TO INDUSTRY INFORMATION?

A. Yes. Included in my rebuttal testimony are Attachments EMR-2 and EMR-3R, which are water and wastewater summaries of the various plant accounts for which actual Monarch data was used to a large degree in estimating the applicable service lives for Monarch's utility property accounts. The data sets contain a listing of the plant

investments for each property account, the life table percent surviving at the maximum period considered in the actuarial analysis, an assessment of the goodness of the service life data analysis, and the percent of Monarch's property within the categories.

In reviewing the attachments one will see that 88% plus fell into the good to excellent actuarial study results for the Company's water property investments, and approximately 50% of the wastewater property investment studies fell in to the good to excellent actuarial study results. For wastewater, an additional 37% of the property was related to Collection Mains which did not produce meaningful study results. Given that the property is of a long average service life that has achieved a relatively young property age, one would not anticipate significant levels of retirements to-date. In case where reasonable levels of actuarial data did not exist, greater weight was placed on information from other companies in the industry.

Ms. Mathis uses the number of accounts to attempt to show that a significant portion of the estimated lives were based solely on industry comparisons, when in fact a large portion of the Company's asset investment's lives were based upon an analysis of Monarch's internal data. Ms. Mathis' testimony refers to industry data comparisons which were for many of Monarch's minor investment balance accounts.

On page 9, lines 17-24 of her testimony Ms. Mathis goes on to criticize the water and wastewater companies that were utilized as a basis to estimate service lives, for what are in many cases smaller property account investments. Various of the company properties that were considered/used in the life estimation process are both in adjoining states as well as have similar water sources (ground water as opposed to

surface water), treatment, distribution and waste water collection and treatment facilities.

Q. WHAT CRITIQUE DOES MS. MATHIS MAKE OF THE EXPERIENCE BANDS USED IN YOUR DEPRECIATION STUDY ANALYSIS, AND WHAT IS YOUR RESPONSE?

A. On page 11, lines 6-7, of her testimony, Ms. Mathis states, "The experience bands show on average 3, or 4, or 5, or 6 year widths, but none more than 10 years.... "This is not enough retirement data, in my opinion to perform a reliable actuarial analysis for a group depreciation study." Ms. Mathis' statement is an unsupported opinion. Ms. Mathis provides no support and fails to reference any material with regard to the 10 year bands that she implies are necessary for actuarial life analysis.

Attached to my testimony as Attachment EMR-4R, are excerpts of Mr. Frank K. Wolf and Mr. W. Chester Fitch's, noted depreciation experts, professors' authored textbook entitled "Depreciation Systems" they state the following on page 186:

> The analyst must use good judgment when determining band widths. Many empirical procedures governing this choice have been developed. These include the selection bands of fixed width, often 3, 5, or ten years; rolling bands in which one band overlaps the next, and shrinking bands, in which the width of the band systematically decreases.

The textbook goes on to say on page 187, "The ultimate combination of bands is the overall band, which combines all individual placement and experience (retirement) band into a single, overall band. The attribute of the survivor curve obtained from this band is that it uses every available exposure and retirement."

Again, it is apparent Ms. Mathis does not fully understand or appreciate the depreciation study processes.

Q. DO YOU HAVE ANY SUPPORT TO CONTRADICT MS. MATHIS' ASSERTION THAT THE COMPLETED LIFE ANALYSIS LACKS SUFFICIENT INFORMATION TO SUPPORT THE AVERAGE SERVICE LIFE ESTIMATE INCORPORATED WITHIN THE MONARCH DEPRECIATION STUDIES?

A. To demonstrate that Ms. Mathis' criticism that the retirement rate analysis fails to include sufficient historical data for study analysis, I am including some curve plots and observed life tables for several of Monarch's larger property accounts as Attachment EMR-5R. One can readily see that there is a considerable amount of retirement data within the observed life tables and that the estimated average service life shown on the plots, along with the information provided in Section 4 Study Results of each depreciation study, fairly represents the life of Monarch's property.

Q. WHAT POSITION DOES MS. MATHIS ADVANCE WITH REGARD TO COST OF REMOVAL AND WHAT IS YOUR RESPONSE?

A. On page 11, lines 20-21 of her testimony Ms. Mathis states, "The cost of removal is the cost of demolishing or dismantling plant, and essentially labor cost." Ms. Mathis is implying that such costs are limited to simply the actual dismantle or removal. As further evidence of her presumed limited interpretation, she goes on to state on page 12, lines 18-21, "In consulting with Staff witness Heidi Graham, who is the water engineering manager at the Public Utility Commission of Texas, I understand that,

once retired, the water mains are not removed, but instead abandoned in place, with no inherent cost of removal."

Ms. Mathis advances this position notwithstanding the fact of Monarch's response to Staff RFI 11-1: "Various mains are abandoned in place, while other components of the property class are, by necessity, physical(ly) removed." Ms. Mathis fails to recognize that cost of removal, which should actually be referred to as cost to retire involves more than just dismantlement or removal. Any and all such costs that are incurred in conjunction with the retirement of said property must be charged to the cost of removal component of NARUC Account 108 in accordance with the NARUC directive, which states,

> At the time of retirement of depreciable utility plant in service, this account shall be charged with the book cost of the property retired plus the cost of removal, and shall be credited with the salvage value and any other amounts recovered, such as insurance.

Such cost to retire plant in service includes the cost of disconnection of the property from the operating system when property is retired. Given that many such retirements occur as smaller segments of the system, disconnecting by means of cutting and removing segments to enable replacement component to be installed, travel, supervision, engineering, and safety, all can add considerable cost to the task even for Mains or Services property accounts. It is not atypical for lay individuals to believe that retiring property simple means walking away from the assets, but there are clearly costs associated with the end of above ground facilities and underground

facilities. This is demonstrated in reviewing the appropriately charged cost of removal/retirement cost of operating companies throughout the industry.

Ms. Mathis fails or refuses to acknowledge that such end of life costs exist, when in fact there is industry evidence, that has been provided, to the contrary.

Q. WHAT IS MS. MATHIS' CRITICISM OF THE INDUSTRY INFORMATION USED AS A BASIS FOR SALVAGE ESTIMATES INCLUDED IN THE PROPOSED MONARCH DEPRECIATION RATES?

A. Again, Ms. Mathis, on page 12 of her testimony, as with the industry life data, she simply quotes the company's response to RFI 11-5 response and responds by stating the obvious, that "these are companies that do not reside in the state of Texas, and may not be comparable to Monarch Utilities facilities." Ms. Mathis apparently believes that crossing the border into Texas would make costs and responsibilities different or disappear. It is simply irrational to ignore such costs when they are known to exist.

Q. MS. MATHIS RECOMMENDS THE USE OF CURRENT COMMISSION APPROVED DEPRECIATION RATES. PLEASE PROVIDE YOUR RESPONSE AND DISCUSS THE BASIS OF THE COMMISSION SCHEDULE PROVIDED BY MS. MATHIS.

A. On page 13, lines 3-5 of her testimony, Ms. Mathis makes the following recommendation, that Monarch should use the existing plant and property depreciation service lives effective on April 9, 2010 in TCEQ Docket Nos. 36630-R and 36631-R," noting that this does not include net salvage parameters.

She actually included as Attachment JM-2, Monarch's 2010 approved service lines. The listed ASL's, which are group depreciation based average service lives as opposed to unit based depreciation lives, are directly from the depreciation studies that I performed on Monarch's property as of December 31, 2006.

The ASL's, as approved by the Commission, were developed in the exact same manner in which the ASL's and Net Salvage percentages were developed in the current December 31, 2014 analysis. Where any actual Monarch historical data was available, it was used with the Retirement Rate method to estimate an average service life. In that earlier study, where there was not sufficient actual company historical data available, essentially the same or similar industry life and salvage information was used as a basis for the estimated Monarch Water and Wastewater life and salvage depreciation parameters. In the current study, there were additional years of company historical data available to allow for greater levels of historical data for life analysis purposes.

Q. PLEASE PROVIDE A BRIEF SUMMARY OF THE DEPRECIATION RATES RECOMMENDED PER YOUR COMPLETED DEPRECIATION STUDIES?

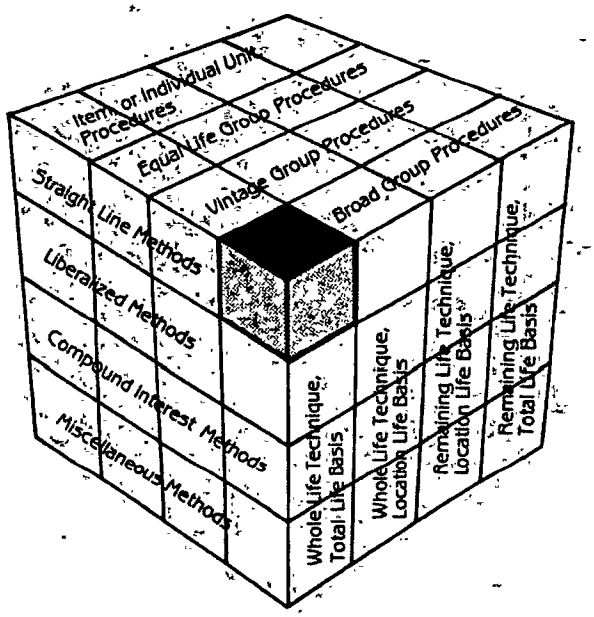
A. The average service lives and net salvage percents and resulting depreciation rates as set forth within the filed depreciation studies are correct, as they exist. The results are based upon the completion of comprehensive depreciation studies using widely accepted depreciation method, procedures, and techniques, and calculated using group depreciation procedures (a depreciation approach underlying the depreciation lives as set forth in the prior Commission-approved schedule of lives effective as of April 9, 2010.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes.

A.G.A. Catalog No. A30010
EEI Publication No. 04-83-22

An Introduction to Depreciation of Public Utility Plant and Plant of Other Industries



Depreciation Committee, American Gas Association
Depreciation Accounting Committee, Edison Electric Institute

APPENDIX B

METHODS, PROCEDURES AND TECHNIQUES

Brief descriptions of the depreciation Methods, Procedures and Techniques referred to on Page 15 are given in this Appendix. Examples of their use will be found in the latter section of this Appendix.

METHODS

The depreciation method describes or refines the pattern of depreciation accruals in relation to accounting periods, or in some instances, in relation to use. The method is usually defined in its application to a single unit. It may be thought of as the basic capital recovery formula.

1. Straight-Line Method: This is the method most widely used by utility companies for accounting and rate making purposes. It spreads depreciation expense in direct proportion to the estimated service life of the plant.

2. Liberalized Methods: Among these methods are the 200 percent declining balance method and the sum-of-the-years-digits methods. The use of these methods produces high annual depreciation expense in the early years of the plant's life and low expense in later years.

3. Compound Interest Methods: Among these methods are those of computing depreciation accruals based on the sinking fund formulas and the compound interest formulas. The use of these methods produce low over-all depreciation credits in the early years of the plant's life and higher over-all credits to the reserve in the later years. As has been pointed out on page 22, the depreciation expense under the sinking fund method is of a constant rate, while the interest earned is added to the fund to give the over-all credits to the reserve. In the compound interest methods the interest is added to the constant accrual rate to give the over-all depreciation expense. The Straight-Line Method is a compound interest method in which the interest rate is zero.

4. Miscellaneous Methods: These are methods which do not properly fit into the first three categories. Among them are the Observed Condition method, based on physical inspection of the units of property; the Retirement Accounting method where the entire cost of a unit of property is charged to depreciation expense at the time of its retirement; the Replacement Accounting method whereby the cost of replacing a unit is charged to depreciation expense at the time of retirement of the unit; Percentage of Gross Income method, and others.

PROCEDURES

The several depreciation methods may be applied in combination with several alternate procedures. The nature of the procedure varies with the form of depreciable base used. The type of base may range from a single item or unit of property to a broad group, encompassing units of similar but not identical characteristics having different life spans and installed over a range of years.

1. Item, or Individual Unit, Procedure: The Item Procedure is the simplest and most direct to use as far as the mechanics of application of a depreciation method are concerned. Because of its simplicity, it is frequently used to demonstrate the mechanics of depreciation analysis. This sometimes results in an over-simplified impression of depreciation accounting.

   The Item Procedure requires a specific record for each individual physical unit of depreciable plant on which the depreciation accruals, based on any of the several depreciation methods are accumulated by each accounting period. As a result of this requirement, this procedure is not considered practical for mass property associated with utility operations because of the burdensome volume of record keeping involved in its use. Properly applied, it can realize to a greater extent than any other procedure the fundamental objective of recovering the cost of each unit of plant over its service life.

   Since each item or unit must "go it alone," a deficiency in accruals, due to early retirement, is charged to expense upon retirement. Accruals on a unit that outlives its life expectancy are stopped when the original cost less estimated net salvage has been recovered.

2. Equal-Life Group Procedure: The Equal-Life-Group Procedure overcomes the principal disadvantage of the Unit Procedure (voluminous records requirement) and still tends to realize the objective of recovering the cost of each element of plant during its service life. This is achieved through the use of a depreciable base segregated into groups of plant of equal life expectancy. Since life expectancy is approximately uniform within this group the entire group is considered to be retired at the same age as a unit. Hence, the equal-life group acts like, and may be depreciated as, a single item or unit.

   It is not practical to identify and directly subdivide mass utility property into groups of equal-life

expectancy, with even large scale modern computers. This may be done indirectly, however, through the use of plant life statistics, as reflected in the Iowa survivor curves, the Kimball survivor curves, and others.

One statistical approach to the equal-life group procedure is known as the Unit-Summation Procedure. Under this procedure mass accounts are subdivided into groups of equal-life expectancy through the use of plant life tables, without identifying individual units of property.

The Equal-Life-Group Procedure may have a substantial effect on depreciation rates and recovery patterns, depending on the rate of growth and the dispersion pattern of plant retirements. Examples are given in Chapter 7, The Depreciation Reserve. Other studies have shown that the Unit-Summation Procedure produces depreciation accruals 15% higher than the Broad Group Procedure, assuming a 30-year average life, an Iowa Type S_1 dispersion and an annual plant growth rate of 8%.

A variant of the Unit-Summation Procedure is the 20-Retirement Groups Procedure. This is discussed in Chapter 7.

3. The Vintage Group Procedure: Under the Vintage Group Procedure, the plant base is divided into individual installation vintages, for each of which an individual life estimate is developed. One way of developing the average service life for a single vintage of plant installations is given in Chapter 5, Average Service Life, in the section, Original Group Method. The individual lives are then used to develop a composite life for the entire group. This Procedure although somewhat simpler than the Equal-Life Group Procedure, does not relieve the long-lived units of the short-lived depreciation burden and is not in this respect substantially different from the Broad Group Procedure. The Vintage Group may be used as an intermediate step in applying the Equal-Life Group Procedure.

4. The Broad Group Procedure: The Broad Group Procedure makes use of the average life of all the units within a group usually, but not necessarily, performing a similar function or belonging to the same class of service without regard to distinguishing characteristics within the group. Accrual deficiencies due to early retirement of short-lived units are made up by accruals on other

units which outlive the average life of the group. The greater simplicity of maintaining records makes the Broad Group Procedure one of the more practical for most classes of utility property where large numbers of units are involved.

In general, the broader the plant grouping used, the fewer the records required for depreciation purposes and the more complex the underlying concepts become. The Item or Individual Unit Procedure, for example, is easily understood and most frequently used for illustration purposes. The Broad Group Procedure, on the other hand, requires a working knowledge of plant life statistical theory for proper application.

TECHNIQUES

In addition to the combinations of depreciation methods and procedures, at least two additional basic conditions must be considered in planning depreciation analysis and accounting in order to specify the depreciation system used as to method, procedure and technique. These conditions are concerned with the portions of the average service life used in the depreciation system, rather than the estimate of average service life itself and, for want of a better term, are referred to in this volume as Techniques. The two basic techniques involve the use of either the Whole-Life or the Remaining-Life in the depreciation calculations. Each of these basic Techniques must then be qualified as to whether it is on the Location-Life Basis or on the Total-Life Basis.

1. The Whole Life Technique: The Whole Life Technique spreads depreciation over the entire life of the plant by making use of the entire average service life in the depreciation formula. In the event that the average service life estimate changes, the new service life is merely substituted for the old. Under the customary use of the Whole Life Technique, no attempt is made to adjust the new accrual rate for aberrations in past life estimates. The life used in the Whole Life Technique should be reviewed periodically for changes to minimize accumulation of excesses or deficiencies in recovery.
2. The Remaining Life Technique: The Remaining Life Technique spreads the unrecovered cost of plant over the estimated remaining years of life of the plant, and may be used with Item or Group Procedures. Spreading the unrecovered cost over the estimated remaining years of life tends to eliminate estimated deficits or excesses in the Depreciation Reserve

which may occur in the case of the Whole Life Technique due to variations in life estimates, changes in depreciation systems used and extraneous entries to the Reserve. The amount of deficits or excesses, if any, in the Reserve is always a controversial matter and constitutes an estimate, at best.

Use of the Remaining Life Technique does not eliminate the need for periodic review of the life estimate in use. In general, the better the life estimates, the better the results obtained with any depreciation practice. The Remaining Life Technique, however, is well adapted to changing the depreciation rate sufficiently in the right direction to adjust for the so-called excesses or deficiencies in Depreciation Reserves.

3. Location-Life Basis; Total-Life Basis: The cost of a unit of property, particularly in utility plant accounting, usually consists of the cost of material plus the cost of installation. Frequently the material or equipment may be removed from one location and if it is in good condition, re-installed in another location. The Location-Life is, obviously, the period in which it remained in one location. The installation costs must be on a Location-Life basis, since they cannot be moved. The Total-Life of the material or equipment is the sum of the Location-Lives. Most depreciation systems use the Location-Life Basis for the greater portion of the plant. However certain plant accounts either exclude installation costs or they may be segregated, as for example the accounts for meters, and transformers, and for such accounts the Total-Life Basis is the one most commonly used.

Attachment EMR-2R

Monarch Utilities I, LP
All Water Systems

Summary of Original Cost of Utility Plant in Service
as of December 31, 2014 and
Goodest of Service Life Analysis Results

NARUC Account No. (a)	Description (b)	Original Cost 12-31-14 (c)	End Of Life Table % Surv	Life Analysis Results	Limited	Modest	Good	Good To Excellent	Excellent	Total
	DEPRECIABLE PLANT									
	Source of Supply									
307.20	Wells & Springs	15,325,217 42	39	**Excellent**					15,325,217.42	
	Total Source of Supply Plant	15,325,217.42								
	Pumping Plant									
304.20	Pumping Structures & Improvements	409,780.58	98	**Limited**	409,780.58					
309.20	Other Plant & Equipment	26,780.50								
310.20	Electrical Equipment	6,271,216.68	22	**Excellent**					6,271,216.68	
311.20	Electric Pumping Eq.	7,356,651.88	22	**Excellent**					7,356,651.88	
311.30	Other Pumping Eq	2,218.25								
311.40	Booster Pumping Eq	77,309.71								
	Total Pumping Plant	14,143,957.60								
	Water Treatement Plant									
304 30	WT Structures & Improvements	9,287,585.76	85	**Modest**		9,287,586				
320 30	Water Treatment Equipment	6,192,043.01	9	**Excellent**					6,192,043	
	Total Water Treatment Plant	15,479,628.77								
	Transmission & Distribution Plant									
304.40	T & D Structures & Improvements	26,427.71								
330.40	Distr. Reservoirs & Standpipes	14,607,494.97	58	**Good to Excellent**				14,607,495		
331.40	Water Lines	47,129,984.60	73	**Good to Excellent**				47,129,985		
	Total Trans & Distr Mains	47,129,984.60								

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Monarch Utilities I, LP
All Water Systems

Summary of Original Cost of Utility Plant in Service
as of December 31, 2014 and
Goodest of Service Life Analysis Results

NARUC Account No	Description	Original Cost 12-31-14	End Of Life Table % Surv	Life Analysis Results	Limited	Modest	Good	Good To Excellent	Excellent	Total
333.40	Services	355,317.55	81	**Good**			355,318			
334.40	Meters	5,149,213.31	0	**Excellent**					5,149,213	
335.40	Hydrants	388,453.09	15	**Excellent**					388,453	
339.20	Other Plant & Equipment	13,414.68								
	Total Trans & Distr Plant	67,670,305.91								
	General Plant									
304 50	Adm & Gen Structures & Improvements	2,103,219.02	90	**Modest**		2,103,219				
	Total Structures & Improvements	2,103,219.02								
340.50	Office Furniture & Equipment	897,039.14								
	Total Office Furniture & Equipment	897,039.14								
341 50	Transportation Equipment	958,358.47	78	**Good**			958,358			
344.50	Laboratory Equipment	105,561.80								
345.50	Power Operated Equipment	220,731.49	82	**Good**			220,731			
346.50	Communication Equipment	481,514.72	95	**Modest**		481,515				
347.50	Tools, Shop & Garage Equipment	214,264.75	25	**Excellent**					214,265	
	Total General Plant	4,980,689.39								
	TOTAL DEPRECIABLE PLANT	117,599,799.09			409,781	11,872,320	1,534,408	61,737,480	40,897,060	116,451,047
					0.3%	**10.1%**	**1.3%**	**52.5%**	**34.8%**	**99.0%**
									88.6%	

Attachment EMR-2R

Monarch Utilities I, LP
All Water Systems

Summary of Original Cost of Utility Plant in Service
as of December 31, 2014 and
Goodest of Service Life Analysis Results

NARUC Account No.	Description	Original Cost 12-31-14	End Of Life Table % Surv	Life Analysis Results	Limited	Modest	Good	Good To Excellent	Excellent	Total
	NON-DEPRECIABLE PLANT									
301.00	Organization	0.00								
302 00	Franchises And Consents	0.00								
303.00	Miscellaneous Intangible Plant	0.00								
303.20	Land & Land Rights	0.00								
303.30	Land & Land Rights	0.00								
303.40	Land & Land Rights	0.00								
303.50	Land & Land Rights	1,641,883.14								
303.60	Land & Land Rights	0.00								
	TOTAL NON-DEPRECIABLE PLANT	1,641,883.14								
	TOTAL PLANT IN SERVICE	119,241,682.23								
		119,241,682.23								

Attachment EMR-3R

Monarch Utilities I, LP
All Wastewater Systems

Summary of Original Cost of Utility Plant in Service
as of December 31, 2014 and
Goodest of Service Life Analysis Results

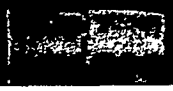
Account No. (a)	Description (b)	Original Cost 12-31-14 (c)	End Of Life Table % Surv	Life Analysis Results	Modest To Good	Good	Good To Excellent	Excellent	Total	Sewer Lines
	DEPRECIABLE PLANT									
	Collection Plant									
354.20	Structures & Improvements - Collection	3,568,059.87	58	Good		3,568,060				
354.40	Structures & Improvements - Collection	50,306.07								
360.20	Sewers Lines	2,623,122.89								
361.20	Sewers-Gravity	5,586,361.44								
362.20	Clarifiers & Media	170,727.11								
363.20	Service Connections	23,116.94								
364.20	Flow Meters	60,116.55								
	Total Collection Plant	12,081,810.87								
	Pumping Equipment									
355.20	Electrical Equipment	1,783,392.57	90	Modest to Good	1,783,393					
370.30	Manholes	788,401.73								
371.30	Lift Station Pumps	706,957.42	18	Excellent				706,957		
	Total Pumping Equipment	3,278,751.72								
	Treatment & Disposal Equipment									
380.40	Treatment & Disposal Equipment	3,578,150.05	40	Good		3,578,150				
381.40	Treatment & Disposal Equipment	2,878,295.31	28	Excellent				2,878,295		
	Total Treatment Plant	6,456,445.36								

Attachment EMR-3R

Monarch Utilities I, LP
All Wastewater Systems

Summary of Original Cost of Utility Plant in Service
as of December 31, 2014 and
Goodest of Service Life Analysis Results

Account No.	Description	Original Cost 12-31-14	End Of Life Table % Surv	Life Analysis Results	Modest To Good	Good	Good To Excellent	Excellent	Total	Sewer Lines
	General Plant									
390.10	Office Furniture & Equipment	109,202.95								
395.70	Power Operated Equipment	226,898.48	58	Good to Excellent			226,898			
396.70	Communication Equipment	60,940.38								
397.70	Miscellaneous Equipment	2,363.21								
	Total General Plant	399,405.02								
	TOTAL DEPRECIABLE PLANT	22,216,412.97			1,783,393	7,146,210	226,898	3,585,253	12,741,754	8,209,484.33
					8.0%	32.2%	1.0%	16.1%	57.4%	37.0%
								49.3%		
303.50	Land & Land Rights	0.00								
353.40	Land & Land Rights	24,093.00								
	Total Plant In Service	22,240,505.97								



ciation Systems

FRANK K. WOLF

W. CHESTER FITCH

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A characteristic of the placement band is that the more recent the placement, the less the experience and the shorter the survivor curve. Recent placement bands may be too short to give significant information about either the life or the general shape of the curve. In contrast, the most recent experience bands yield the longest life tables.

Recent experience bands yield the most recent retirement ratios, providing the forecaster with valuable information about the current retirement ratios for all ages. The analyst may examine the influence of a specific force of retirement by using the experience band method. For example, the effect of a recent change in a company's maintenance policy could be examined by comparing the survivor curve from an experience band that ends at the last year in which the old policy was in effect with the survivor curve from an experience band that starts with the first year during which the new policy was used.

Choosing the width of either the experience band or the placement band is an important decision that the analyst must make. A band of only one year will typically exhibit significant randomness, resulting in a survivor curve that may be difficult to analyze. Combining several years in a single band will result in an average curve that is smoother; that is, it shows less randomness than the curves from the one-year bands. This smoothing, or averaging, effect is a primary motivation for combining single years into multiple bands. Although widening a band has the advantage of smoothing the data, it has the disadvantage of obscuring or hiding differences between the individual bands.

The analyst must use good judgment when determining band widths. Many empirical procedures governing this choice have been developed. These include the selection bands of fixed width, often 3, 5, or 10 years; rolling bands, in which one band overlaps the next; and shrinking bands, in which the width of the band systematically decreases.

A preferred approach is to select the bands based on the history and the activities that occurred during the period defined by the bands. Because placement bands are often used to describe property of a particular technology, a band could be chosen that will be wide enough to include all property of a similar technology. Experience bands may be chosen to include the calendar years during which a single force of retirement was of particular interest.

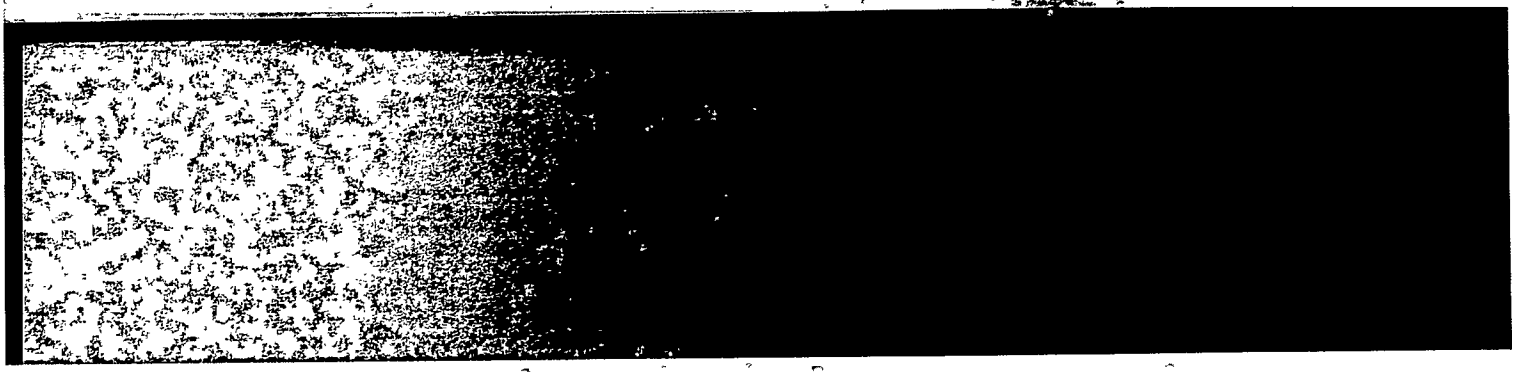
Bands may be chosen to detect change in the survivor characteristics. Suppose, for example, that an experience band covering the past 12 years had been selected because it was believed that the economic forces had been somewhat constant during this period. To test for change during this period, the 12 years can be subdivided into nonoverlapping intervals. Division of these 12 years into the first five years and the last seven years would be an example. The life characteristics of the single 12-year period can be compared to the five-year and th indicated by the survivor curve weighted average of the curve fr a comparison of the shorter per been constant during the 12-yea

The ultimate combination bines all individual placement a band. The major attribute of th that it uses every available expos grand average obscures the dyn tics of the property. In addition, resulting survivor curve. Each different group of property. The tions from all vintages and the most recent. This pattern contin vations from only one vintage. I of the overall band, and, in spi points, it should be given limite

Incomplete Actuarial Data

Notice that the Account 897 the 1962 through 1967 placemen is not unusual. Legislation en passed in the mid 1930s, and im the late 1930s. The start of imple company, and some companies h faced with the problem of initi had been in service for some ti physical inventory so that, with tion obtained from accounting property currently in service co point on, exposure and retireme chapter) represents a data matr vintages.

Consider the construction experience band shown in Figur ment years are available even t ments, indicated by the question a survivor curve for an early pl tional data, the fraction survivin obtained or estimated. In Acco data. For example, the 1963 vin



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compared to the five-year and the seven-year periods. The mean service life indicated by the survivor curve constructed from the 12-year band is a weighted average of the curve from the five-year and seven-year bands, and a comparison of the shorter periods will show whether the service life has been constant during the 12-year period.

The ultimate combination of bands is the overall band, which combines all individual placement and experience bands into a single, overall band. The major attribute of the survivor curve obtained from this band is that it uses every available exposure and retirement. On the other hand, this grand average obscures the dynamic characteristics of the life characteristics of the property. In addition, it is difficult to define the meaning of the resulting survivor curve. Each individual retirement ratio is based on a different group of property. The first retirement ratio will include observations from all vintages and the second retirement ratio from all but the most recent. This pattern continues until the final point is based on observations from only one vintage. It is difficult to figure out the exact meaning of the overall band, and, in spite of the fact it does include all the data points, it should be given limited significance.

Incomplete Actuarial Data

Notice that the Account 897 data are incomplete. There are no data for the 1962 through 1967 placements before 1968, and this type of gap in data is not unusual. Legislation enacting the Uniform System of Accounts passed in the mid 1930s, and implementation in some industries started in the late 1930s. The start of implementation also depended on the size of the company, and some companies have started only recently. Companies were faced with the problem of initiating retirement records for property that had been in service for some time. The usual solution was to conduct a physical inventory so that, with the examination of records and information obtained from accounting and operating personnel, the age of the property currently in service could be estimated and recorded. From that point on, exposure and retirement data were kept. Figure 8.8 (see end of chapter) represents a data matrix that is missing data from the first two vintages.

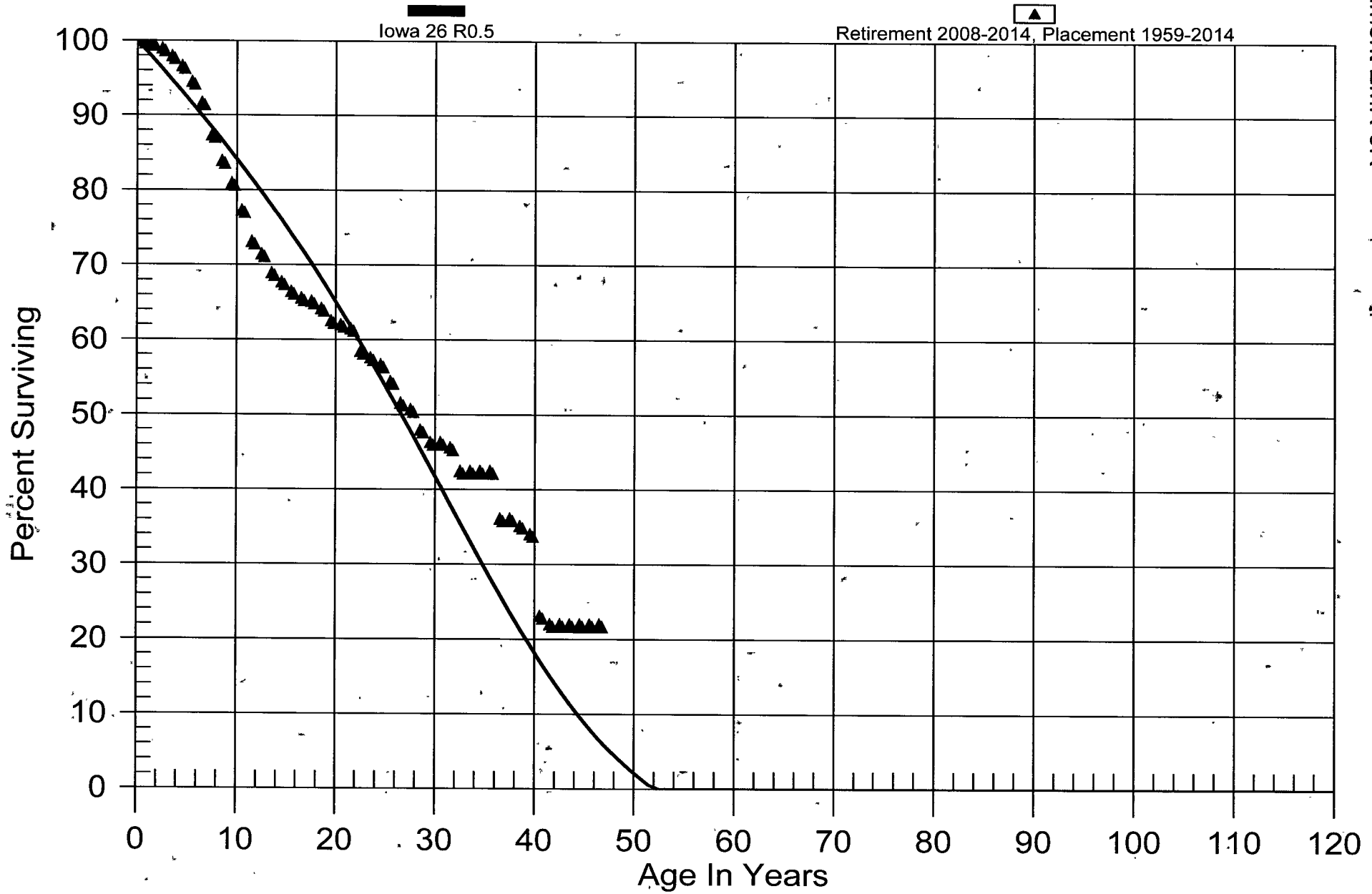
Consider the construction of a survivor curve from the data in the experience band shown in Figure 8.8. Retirement ratios from early placement years are available even though the early history from those placements, indicated by the question marks, is unavailable. But construction of a survivor curve for an early placement band is not possible unless additional data, the fraction surviving from each vintage with missing data, are obtained or estimated. In Account 897, all years before 1968 are missing data. For example, the 1963 vintage is missing data for the age interval 0–

Monarch Utilities I, LP

Water Systems

310.20, 311.20

Original And Smooth Survivor Curves



Attachment EMR-5R

Attachment EMR-5R

Monarch Utilities I, LP
Water Systems
310.20, 311.20
Observed Life Table
Retirement Expr. 2008 TO 2014
Placement Years 1959 TO 2014

Age Interval	*$ Surviving At Beginning of Age Interval*	*$ Retired During The Age Interval*	*Retirement Ratio*	*% Surviving At Beginning of Age Interval*
0.0 - 0.5	$6,971,813.08	$0 00	0.00000	100 00
0 5 - 1 5	$7,754,434 44	$21,754 85	0.00281	100 00
1.5 - 2.5	$8,158,380.73	$58,710.00	0 00720	99.72
2.5 - 3.5	$8,343,862.78	$88,134.19	0 01056	99.00
3.5 - 4.5	$7,628,398.21	$102,145 68	0.01339	97 96
4.5 - 5 5	$7,098,558.70	$154,112 70	0.02171	96 64
5 5 - 6 5	$6,214,179 46	$184,224 42	0.02965	94 55
6 5 - 7 5	$4,003,240.21	$189,444.23	0.04732	91.74
7.5 - 8.5	$3,735,914.31	$146,915.67	0.03933	87.40
8 5 - 9.5	$3,341,652.78	$118,502 36	0 03546	83.96
9 5 - 10 5	$2,747,006.40	$122,957.14	0 04476	80.99
10 5 - 11.5	$2,597,790 09	$141,064.31	0.05430	77 36
11.5 - 12.5	$2,523,941 04	$57,873.73	0.02293	73.16
12.5 - 13 5	$2,513,065 10	$88,567.05	0.03524	71.48
13.5 - 14.5	$2,360,072.49	$41,521 96	0.01759	68.96
14.5 - 15.5	$1,460,358.56	$26,937 91	0 01845	67.75
15.5 - 16.5	$1,115,206 02	$14,804.72	0.01328	66.50
16.5 - 17 5	$872,798.21	$5,750.00	0.00659	65.62
17.5 - 18.5	$819,350.21	$12,135.00	0 01481	65.19
18.5 - 19.5	$602,660.21	$15,222 19	0.02526	64.22
19.5 - 20.5	$534,393 00	$4,743 00	0.00888	62 60
20 5 - 21 5	$616,486.92	$5,088.92	0.00825	62 04
21.5 - 22 5	$582,992 00	$28,632.00	0.04911	61.53
22.5 - 23 5	$602,567.21	$8,969 00	0 01488	58.51
23 5 - 24.5	$667,069.79	$11,132 00	0 01669	57.64
24 5 - 25.5	$577,254 79	$22,542 60	0.03905	56.68
25.5 - 26 5	$554,565 11	$29,389.40	0.05300	54 46
26.5 - 27 5	$487,876.71	$8,023 00	0 01644	51 58
27 5 - 28.5	$375,094 31	$20,252 13	0 05399	50 73
28.5 - 29.5	$348,713.18	$12,218.00	0.03504	47.99
29.5 - 30 5	$259,865.18	$0.00	0.00000	46 31
30.5 - 31 5	$168,951.00	$2,504 00	0 01482	46.31
31 5 - 32.5	$161,889.00	$11,189 00	0 06912	45.62
32.5 - 33.5	$113,999.00	$0.00	0.00000	42.47
33.5 - 34 5	$101,274 12	$9 12	0 00009	42 47
34.5 - 35 5	$98,258 00	$0.00	0.00000	42 46
35.5 - 36.5	$76,779.00	$11,466 00	0.14934	42 46

Attachment EMR-5R

Monarch Utilities I, LP
Water Systems
310.20, 311.20
Observed Life Table
Retirement Expr. 2008 TO 2014
Placement Years 1959 TO 2014

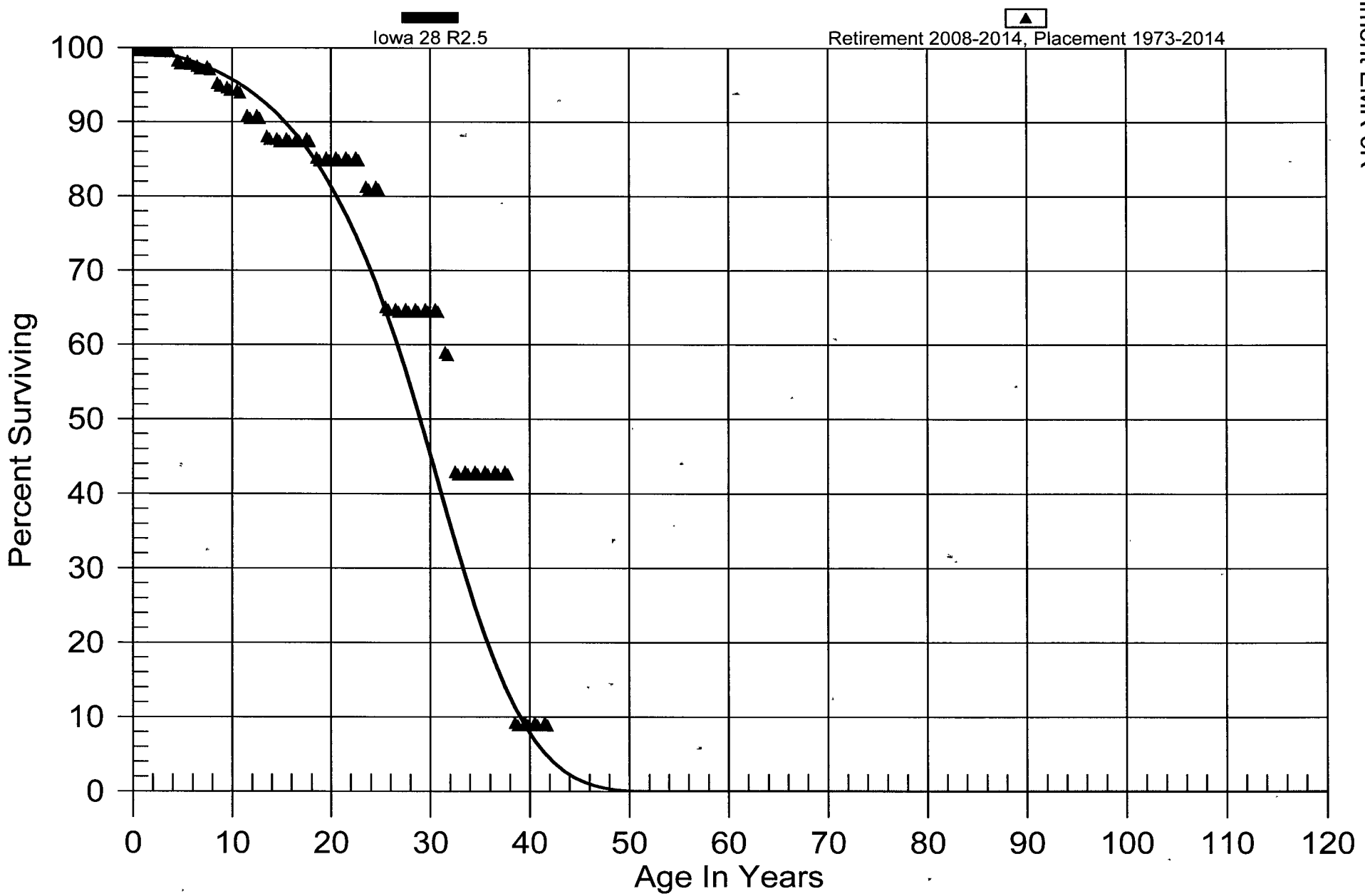
Age Interval	*$ Surviving At Beginning of Age Interval*	*$ Retired During The Age Interval*	*Retirement Ratio*	*% Surviving At Beginning of Age Interval*
36 5 - 37 5	$71,834.00	$0 00	0.00000	36.12
37 5 - 38.5	$69,376.00	$1,836 00	0 02646	36.12
38.5 - 39 5	$59,363 00	$1,895.00	0 03192	35 17
39.5 - 40.5	$50,184 00	$16,067 00	0 32016	34 04
40.5 - 41 5	$31,140.00	$1,506 00	0.04836	23.14
41 5 - 42.5	$11,777 00	$0 00	0.00000	22 03
42 5 - 43.5	$10,875.00	$0.00	0.00000	22.03
43.5 - 44.5	$6,190.00	$0.00	0.00000	22.03
44 5 - 45 5	$10,251.00	$0 00	0.00000	22.03
45 5 - 46 5	$10,251.00	$0 00	0.00000	22.03

Monarch Utilities I, LP

Water Systems

320.30 WATER TREATMENT EQUIPMENT

Original And Smooth Survivor Curves



Attachment EMR-5R

Attachment EMR-5R

Monarch Utilities I, LP
Water Systems
320.30 WATER TREATMENT EQUIPMENT
Observed Life Table
Retirement Expr. 2008 TO 2014
Placement Years 1973 TO 2014

Age Interval	*$ Surviving At Beginning of Age Interval*	*$ Retired During The Age Interval*	*Retirement Ratio*	*% Surviving At Beginning of Age Interval*
0.0 - 0.5	$1,858,537.29	$0.00	0.00000	100 00
0 5 - 1 5	$3,338,508.27	$2,422 88	0.00073	100 00
1 5 - 2 5	$3,511,847.36	$1,140.29	0.00032	99 93
2.5 - 3.5	$4,282,198.41	$937.45	0 00022	99.89
3.5 - 4 5	$3,686,877.31	$60,023.40	0 01628	99.87
4 5 - 5.5	$3,591,111 46	$2,528.83	0 00070	98.25
5.5 - 6.5	$2,811,009.29	$17,950.89	0 00639	98.18
6.5 - 7.5	$2,669,707.73	$3,142.90	0.00118	97.55
7.5 - 8.5	$1,720,793 61	$38,524 47	0.02239	97 44
8.5 - 9 5	$1,512,350 50	$9,044 66	0 00598	95 25
9 5 - 10 5	$895,213.10	$3,309.13	0 00370	94.69
10.5 - 11.5	$881,174 48	$32,421.97	0.03679	94.34
11.5 - 12.5	$842,249 05	$0.00	0.00000	90.86
12.5 - 13.5	$836,225.16	$25,595 85	0.03061	90 86
13.5 - 14.5	$767,768.47	$2,712 00	0.00353	88 08
14.5 - 15.5	$202,784.24	$0 00	0.00000	87.77
15.5 - 16 5	$123,176.24	$0.00	0.00000	87.77
16.5 - 17.5	$80,283 00	$0.00	0.00000	87.77
17 5 - 18.5	$81,883.00	$2,404.00	0.02936	87.77
18.5 - 19 5	$60,546.00	$0.00	0.00000	85 19
19 5 - 20 5	$118,148.00	$0.00	0.00000	85 19
20.5 - 21.5	$973,950.00	$0.00	0.00000	85.19
21 5 - 22.5	$1,020,263 00	$0 00	0 00000	85.19
22.5 - 23.5	$1,010,382.00	$46,492.00	0.04601	85 19
23.5 - 24 5	$944,628.00	$0.00	0 00000	81 27
24.5 - 25 5	$1,138,868.00	$226,963.00	0 19929	81 27
25.5 - 26.5	$927,080.00	$4,060 00	0.00438	65.08
26.5 - 27 5	$909,506.00	$0.00	0.00000	64.79
27 5 - 28 5	$327,643.00	$0 00	0.00000	64.79
28 5 - 29 5	$273,186.00	$0 00	0 00000	64 79
29.5 - 30.5	$278,422 00	$0.00	0 00000	64.79
30.5 - 31.5	$302,440.00	$27,232.00	0.09004	64.79
31.5 - 32.5	$78,100.00	$21,225.00	0.27177	58 96
32 5 - 33.5	$39,450 00	$0.00	0.00000	42 94
33.5 - 34.5	$39,450.00	$0.00	0 00000	42.94
34 5 - 35 5	$52,752 00	$0.00	0 00000	42.94
35 5 - 36.5	$51,301.00	$0.00	0.00000	42 94

Monarch Utilities I, LP

Water Systems

320.30 WATER TREATMENT EQUIPMENT

Observed Life Table

Retirement Expr. 2008 TO 2014

Placement Years 1973 TO 2014

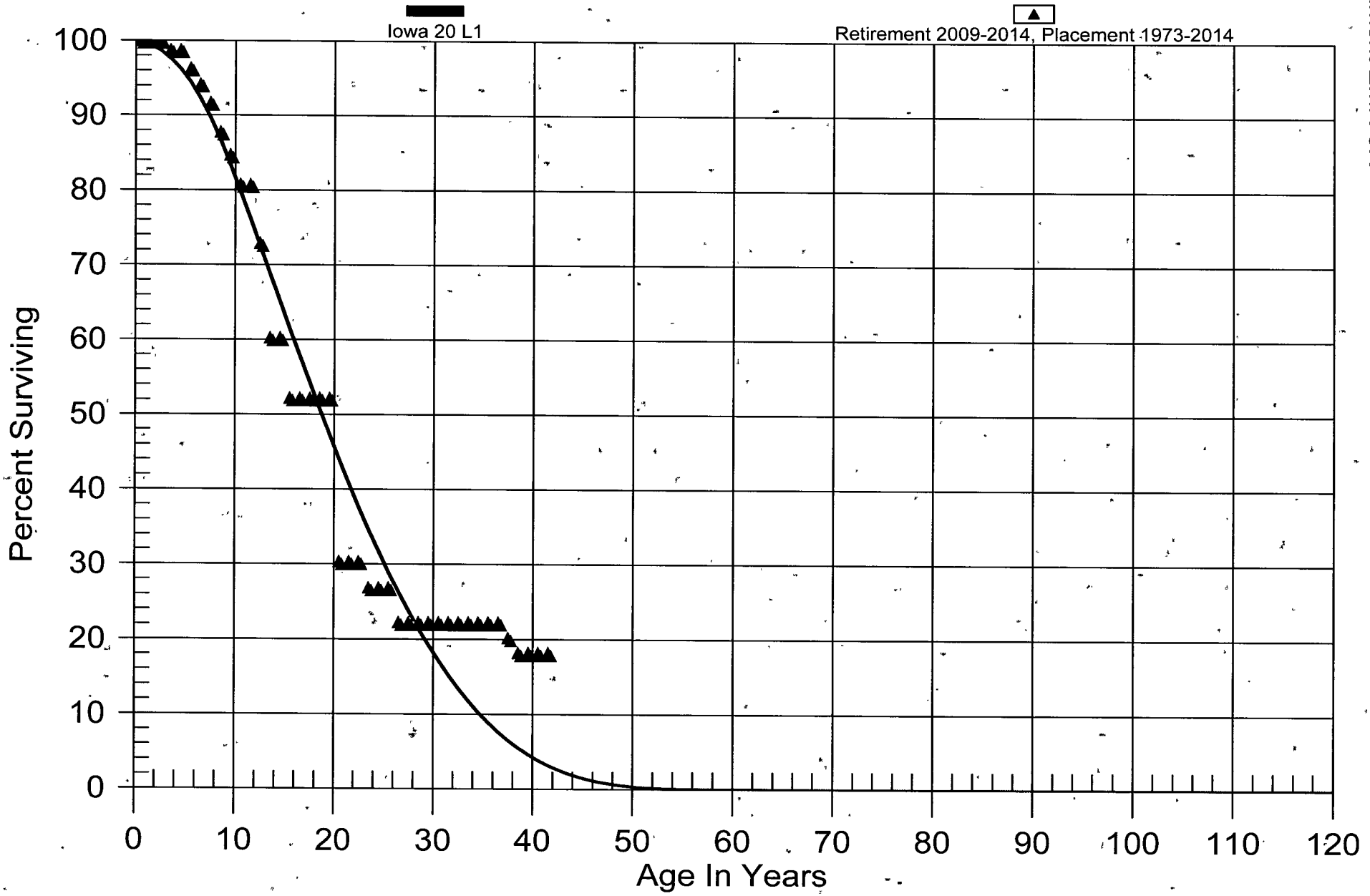
Age Interval	*$ Surviving At Beginning of Age Interval*	*$ Retired During The Age Interval*	*Retirement Ratio*	*% Surviving At Beginning of Age Interval*
36.5 - 37 5	$40,915.00	$0.00	0.00000	42 94
37.5 - 38.5	$33,046.00	$25,929.00	0.78463	42 94
38.5 - 39 5	$7,117 00	$0 00	0 00000	9 25
39.5 - 40.5	$7,117.00	$0 00	0.00000	9.25
40 5 - 41.5	$7,117.00	$0.00	0.00000	9 25

Monarch Utilities I, LP

Wastewater Systems

371.30 LIFT STATION PUMPS

Original And Smooth Survivor Curves



Attachment EMR-5R

Attachment EMR-5R

Monarch Utilities I, LP
Wastewater Systems
371.30 LIFT STATION PUMPS
Observed Life Table
Retirement Expr. 2009 TO 2014
Placement Years 1973 TO 2014

Age Interval	*$ Surviving At Beginning of Age Interval*	*$ Retired During The Age Interval*	*Retirement Ratio*	*% Surviving At Beginning of Age Interval*
0 0 - 0 5	$223,545.88	$0.00	0.00000	100.00
0 5 - 1 5	$198,618 16	$0.00	0.00000	100 00
1.5 - 2.5	$219,852 22	$0.00	0.00000	100.00
2.5 - 3.5	$184,421.24	$2,274 34	0.01233	100 00
3 5 - 4.5	$197,966.32	$0.00	0 00000	98.77
4 5 - 5.5	$193,466.16	$4,799.00	0.02481	98 77
5 5 - 6 5	$154,001.65	$3,397.02	0.02206	96 32
6.5 - 7.5	$146,006.68	$3,862 36	0 02645	94.19
7.5 - 8.5	$129,778 38	$5,561 53	0 04285	91.70
8.5 - 9.5	$113,753.23	$3,952.51	0.03475	87 77
9 5 - 10.5	$131,870.71	$6,105.41	0.04630	84.72
10.5 - 11 5	$118,678 91	$100 00	0.00084	80.80
11 5 - 12.5	$90,100 82	$8,752 34	0 09714	80 73
12.5 - 13.5	$87,636.48	$15,185.36	0.17328	72 89
13.5 - 14.5	$66,514.60	$0.00	0.00000	60.26
14.5 - 15 5	$49,288.29	$6,566.00	0.13322	60.26
15.5 - 16 5	$23,192.00	$0 00	0 00000	52.23
16 5 - 17.5	$11,773 00	$0.00	0 00000	52.23
17 5 - 18.5	$60,248 00	$0.00	0 00000	52 23
18.5 - 19.5	$53,960.00	$0.00	0.00000	52 23
19 5 - 20 5	$50,264.00	$21,053 00	0 41885	52.23
20 5 - 21.5	$30,920 00	$0.00	0 00000	30.35
21 5 - 22.5	$54,244.00	$0.00	0.00000	30.35
22 5 - 23.5	$222,828.00	$25,624.00	0.11499	30.35
23.5 - 24.5	$167,993.00	$0 00	0.00000	26.86
24.5 - 25.5	$167,993.00	$0 00	0.00000	26.86
25.5 - 26.5	$167,993 00	$28,935 00	0 17224	26.86
26.5 - 27 5	$154,208 00	$0.00	0 00000	22 24
27.5 - 28 5	$130,884 00	$0.00	0.00000	22 24
28.5 - 29.5	$33,427.00	$0.00	0 00000	22.24
29 5 - 30.5	$33,427 00	$0.00	0.00000	22.24
30.5 - 31.5	$45,517 00	$0.00	0.00000	22.24
31.5 - 32.5	$56,931.00	$0.00	0.00000	22 24
32.5 - 33.5	$41,781 00	$0 00	0 00000	22 24
33.5 - 34 5	$72,520 00	$0.00	0.00000	22.24
34.5 - 35 5	$54,243 00	$0.00	0.00000	22.24
35.5 - 36 5	$88,360.00	$0.00	0.00000	22 24

Attachment EMR-5R

Monarch Utilities I, LP
Wastewater Systems
371.30 LIFT STATION PUMPS
Observed Life Table
Retirement Expr. 2009 TO 2014
Placement Years 1973 TO 2014

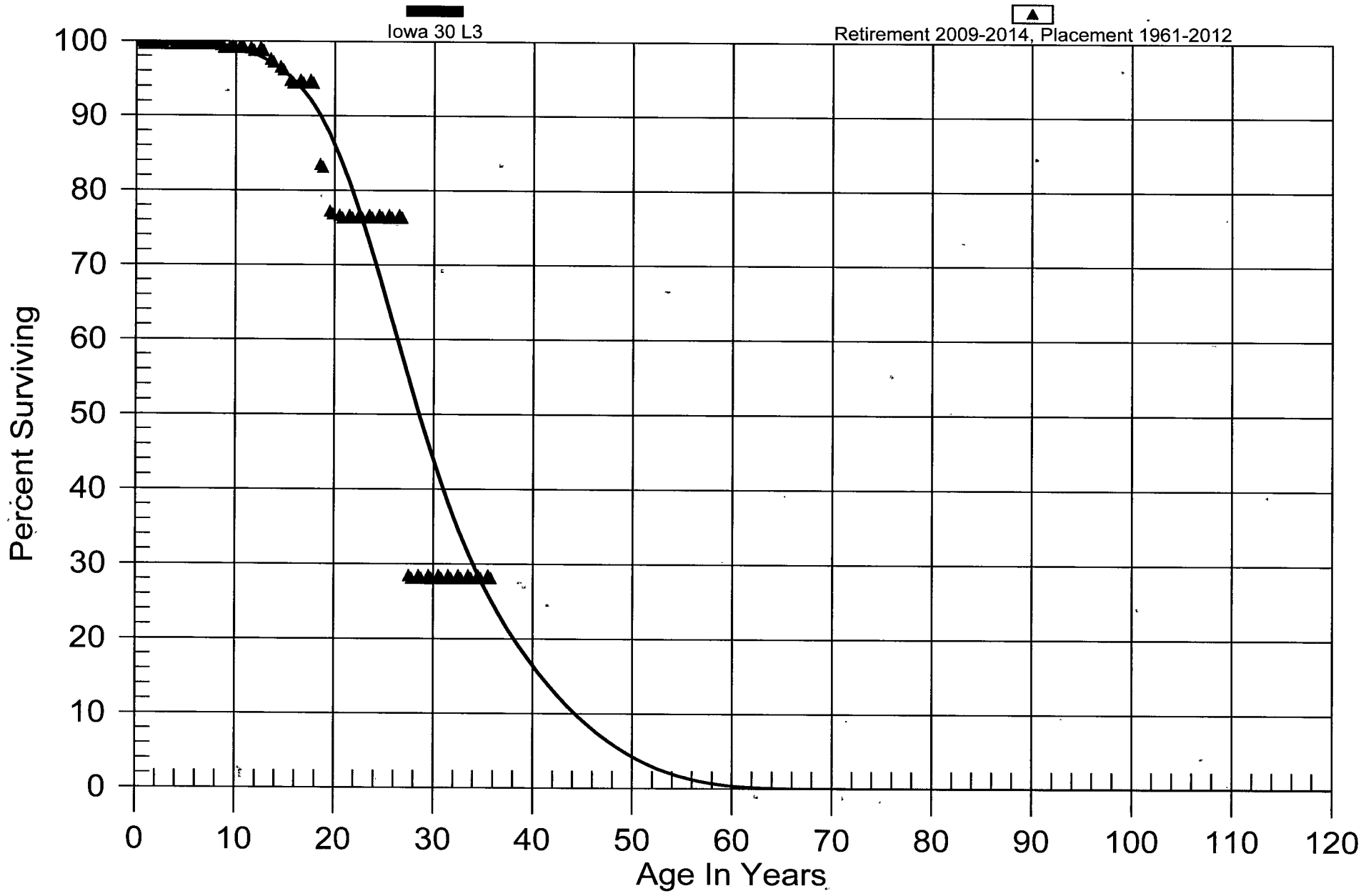
Age Interval	*$ Surviving At Beginning of Age Interval*	*$ Retired During The Age Interval*	*Retirement Ratio*	*% Surviving At Beginning of Age Interval*
36.5 - 37 5	$76,270.00	$7,143.00	0.09365	22.24
37.5 - 38 5	$57,713.00	$5,639 00	0.09771	20 15
38 5 - 39 5	$52,074.00	$0.00	0.00000	18 18
39.5 - 40.5	$21,335 00	$0.00	0 00000	18 18
40.5 - 41.5	$21,335.00	$0 00	0 00000	18.18

Monarch Utilities I, LP

Wastewater Systems

381.40 TREATMENT & DISPOSAL EQUIPMENT

Original And Smooth Survivor Curves



Attachment EMR-5R

Attachment EMR-5R

Monarch Utilities I, LP
Wastewater Systems
381.40 TREATMENT & DISPOSAL EQUIPMENT
Observed Life Table
Retirement Expr. 2009 TO 2014
Placement Years 1961 TO 2012

Age Interval	*$ Surviving At Beginning of Age Interval*	*$ Retired During The Age Interval*	*Retirement Ratio*	*% Surviving At Beginning of Age Interval*
0.0 - 0.5	$359,664 80	$0 00	0.00000	100 00
0.5 - 1.5	$359,664.80	$0.00	0 00000	100.00
1.5 - 2 5	$359,664.80	$0.00	0 00000	100.00
2 5 - 3 5	$301,057.44	$0 00	0 00000	100.00
3.5 - 4 5	$301,057 44	$0.00	0.00000	100 00
4 5 - 5.5	$157,452.89	$0.00	0 00000	100.00
5.5 - 6 5	$161,694.60	$0.00	0 00000	100.00
6.5 - 7 5	$163,318.35	$0 00	0 00000	100.00
7.5 - 8.5	$165,038 73	$749.14	0.00454	100.00
8.5 - 9.5	$179,835.78	$0.00	0 00000	99.55
9.5 - 10 5	$450,177.26	$0 00	0.00000	99 55
10.5 - 11.5	$598,504 51	$2,370 35	0.00396	99.55
11.5 - 12 5	$1,231,768.45	$0.00	0.00000	99.15
12.5 - 13.5	$1,398,530.45	$21,444 00	0.01533	99.15
13 5 - 14 5	$1,468,643.07	$15,767 00	0.01074	97 63
14 5 - 15.5	$1,465,572 48	$27,247.00	0.01859	96.58
15.5 - 16.5	$1,324,090.00	$0.00	0 00000	94.79
16.5 - 17 5	$1,162,895.00	$0 00	0.00000	94 79
17.5 - 18 5	$1,210,664.63	$144,355.00	0.11924	94 79
18.5 - 19.5	$935,214.63	$69,925.00	0.07477	83.49
19 5 - 20 5	$776,305.63	$5,475.03	0.00705	77.24
20.5 - 21 5	$748,334.60	$0.00	0.00000	76.70
21.5 - 22.5	$691,806.60	$0.00	0.00000	76.70
22 5 - 23.5	$740,177 60	$0 00	0.00000	76 70
23.5 - 24 5	$114,258.00	$0.00	0.00000	76.70
24.5 - 25.5	$105,838.00	$0.00	0.00000	76.70
25.5 - 26 5	$109,196.00	$0.00	0 00000	76.70
26.5 - 27 5	$294,305 00	$185,109.00	0 62897	76 70
27.5 - 28 5	$109,196.00	$0 00	0.00000	28 46
28 5 - 29.5	$53,667 00	$0 00	0 00000	28.46
29 5 - 30.5	$53,667 00	$0 00	0.00000	28.46
30.5 - 31.5	$53,667.00	$0.00	0.00000	28.46
31.5 - 32.5	$50,309.00	$0.00	0 00000	28.46
32 5 - 33.5	$50,309.00	$0.00	0 00000	28.46
33.5 - 34.5	$50,309.00	$0 00	0.00000	28 46
34 5 - 35 5	$0 00	$0.00	0.00000	28.46