

DEPRECIATION AND FUNCTIONAL OBSOLESCENCE

An important step in the appraisal of property using the cost approach is the determination of the depreciation or condition of the property. Depreciation in this appraisal was segregated into normal (mostly physical) depreciation, functional obsolescence, and economic obsolescence (addressed based on the income and market approaches). The normal depreciation was determined based on the age of the property and its normal service life; while, functional obsolescence was based on the impact on the property's remaining life caused by factors such as changing technology, service requirements, and competition.

Depreciation - The depreciation was determined based on the property's age and its normal service life using the following formula:

$$\text{Condition} = \frac{\text{Remaining Life}}{\text{Age} + \text{Remaining Life}}$$

or

$$\text{Depreciation} = \frac{\text{Age}}{\text{Age} + \text{Remaining Life}}$$

Where: Remaining Life = $f(\text{Age, Survival Characteristic, Normal Service life})$

Functional Obsolescence - The obsolescence inherent in the property was determined using the above described normal service life in comparison to the property's service life is adjusted for functional factors. The obsolescence was quantified based on the difference between the property's normal service life and its functional service life. The following formula was used to calculate the obsolescence:

$$\text{Obsolescence} = \frac{\text{Normal Service Life} - \text{Functional Service Life}}{\text{Normal Service Life}}$$

Service Lives - (normal versus functional) - The service life of property is that period of time in which it provides the service to which it was designed and placed into service. In most industrial properties there is a difference between a property's normal or physical life and its functional life. A piece of equipment may physically last for an extended period; however, as that property ages changing technology, improvements or enhancement in similar equipment, functional and or service requirements change resulting in decreased utility of the existing equipment, and therefore decrease in value to its owner, this additional deterioration over that defined by the equipment's normal life is functional obsolescence.

Water Industry Service Lives

The service lives used in the depreciation and functional obsolescence calculations were developed based on the property and its use, AUS Consultants' experience in developing depreciation studies for the water and wastewater industries. The following

table details the lives used in the depreciation portion of the replacement cost new less depreciation analysis:

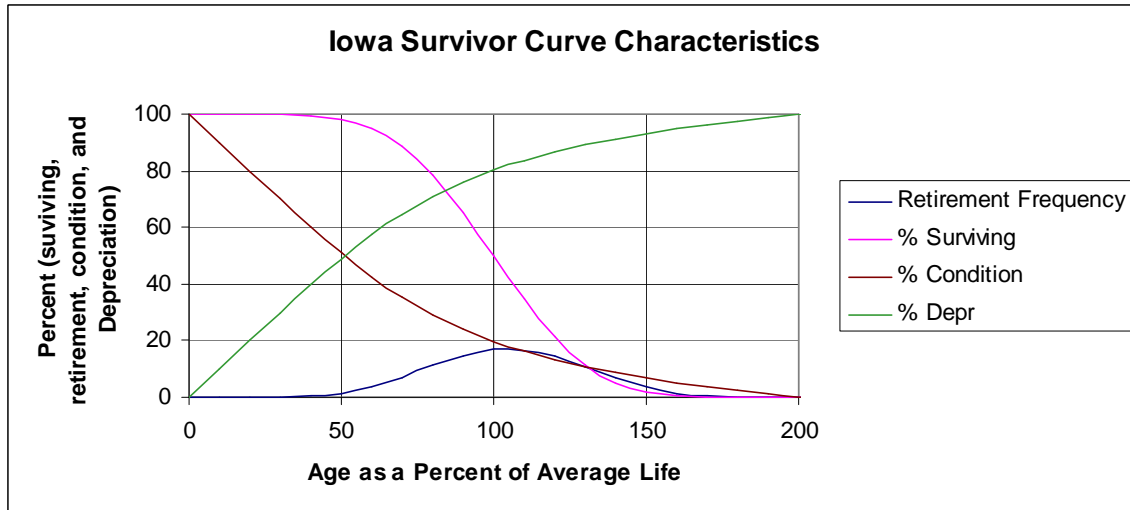
East Norriton Township Pennsylvania
 East Norriton Sanitary Sewer System
 Wastewater Collection and Treatment System
 Investor-Owned Utility
 October 29, 2018

Summary of Account Costing and Depreciation Parameters Used in the Depreciation Original Cost and the Depreciated Replacement Cost New Studies

(1) Account Number	(2) Description	(4)		(5)	(6)	(6b) Life
		(4a) Iowa Survivor / Retirement Curve	(4b) Normal Service Life	Economic Obsolescence	(6a) Tax Depreciation	
			years	years	Table	
353.10	Land & Land Rights - Pumping Station	Non-Depr	0.00	0.00	Non-Depr	0.00
354.10	Structures & Improvements - Pumping	R4.0	45.00	0.00	MACRS	25.00
360.10	Collection Sewers - Force - Mains - CIP	R3.0	60.00	0.00	MACRS	25.00
360.20	Collection Sewers - Force - Mains - PVC	R3.0	60.00	0.00	MACRS	25.00
360.30	Collection Sewers - Force - Mains - DIP	R3.0	60.00	0.00	MACRS	25.00
361.10	Collection Sewers - Gravity - Mains - VCP	R3.0	80.00	0.00	MACRS	25.00
361.20	Collection Sewers - Gravity - Mains - CIP	R3.0	80.00	0.00	MACRS	25.00
361.30	Collection Sewers - Gravity - Mains - PVC	R3.0	80.00	0.00	MACRS	25.00
361.40	Collection Sewers - Gravity - Mains - DIP	R3.0	80.00	0.00	MACRS	25.00
361.50	Collection Sewers - Gravity - Mains - RCP	R3.0	80.00	0.00	MACRS	25.00
361.60	Collection Sewers - Gravity - Mains Unknown Material	R3.0	90.00	0.00	MACRS	25.00
361.70	Collection Sewers - Gravity - Manholes	R3.0	80.00	0.00	MACRS	25.00
363.00	Service Laterals	R3.0	55.00	0.00	MACRS	25.00
364.00	Flow Measuring Devices	R3.0	35.00	0.00	MACRS	25.00
371.00	Pumping Equipment	R3.0	35.00	0.00	MACRS	25.00
396.00	Communications Equipment	R3.0	12.00	0.00	MACRS	12.00

Iowa Survivor Curves

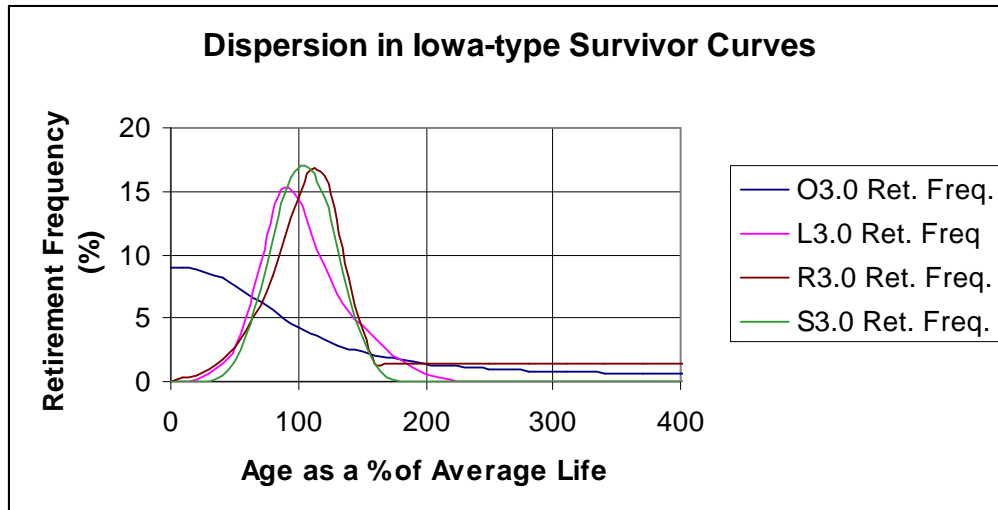
The Iowa Survivor Curves recommended in this appraisal are used to determine the remaining life of the property, and therefore its condition, recognizing the properties' service life and age. The Iowa Survivor Curves allows the appraiser to recognize the property being studied (mains, treatment and pumping plant equipment etc placed in a particular year, say 1985) is part of a larger group of property, i.e., all the property i.e., mains, treatment and pumping plant equipment, etc. As such, the service lives which we refer to in our appraisal are an average service lives for the group, i.e., the average life of all mains, treatment and pumping plant equipment, etc. The Iowa Survivor curve allows the appraiser to calculate the remaining life, and therefore condition, of a subset of the group (the mains placed in 1985) based on the groups': (1) Iowa Survivor Curve, (2) Service Life and the (3) age of property at the appraisal date. An Iowa Survivor Curves depicts how property from a group survives and retires about that groups' average life.



The above figure depicts a typical Iowa-type survivor curve, an S3.0 Iowa-type survivor curve. In this case the survivor curve has been generalized to a service life of 100% of the property's average life, in this generalized form the survivor curve statistics can be utilized with any individual service life in the age-life service life and depreciation calculations. There are four characteristics displayed in the above chart depicting the manner in which property survives and retires about the group's average life, those characteristics are: the retirement frequency (blue), the percent surviving (red), the percent condition (brown) and the percent depreciated (green). The retirement frequency represents the retirement of individual property items about the group's average service life. As can be seen the retirements are distributed about the group's average life with some items retiring before the average life and some items retiring at or after the group's service life. The group's survivor curve is developed from subtracting the retirements as they occur as the property ages. The depreciation curve depicts how much of the property group's life has been consumed; while, the condition curve depicts how much of the property group's life remains. The condition and depreciation curves are complementary in that condition equals 100% minus depreciation and vice versa.

The theory of Iowa Survivor Curves was presented in the 1920s and 30s by Robley Winfrey based on research at Iowa State University (then the Iowa Engineering Experiment Station). Winfrey's research was first published in Bulletin 103 - Life Characteristics of Physical Property and Bulletin 125 - Statistical Analysis of Industrial Property Retirements. (Incidentally, both publications are out of print, I have a copy of Bulletin 125 but not Bulletin 103, I'm still trying to get a copy of that piece of depreciation literature.). Bulletin 125 was updated in 1967 by Professor Harold Cowles of Iowa State University's Department of Industrial Engineering. In conducting his research, Winfrey collected data on industrial property survival and retirement from various sources and analyzed that data as a function of property's age at retirement and ultimately the property groups' service life when all the property in the group was fully retired.

Winfrey discovered the industrial property's survival and retirement fits three basic patterns with relationship to the property's average life:



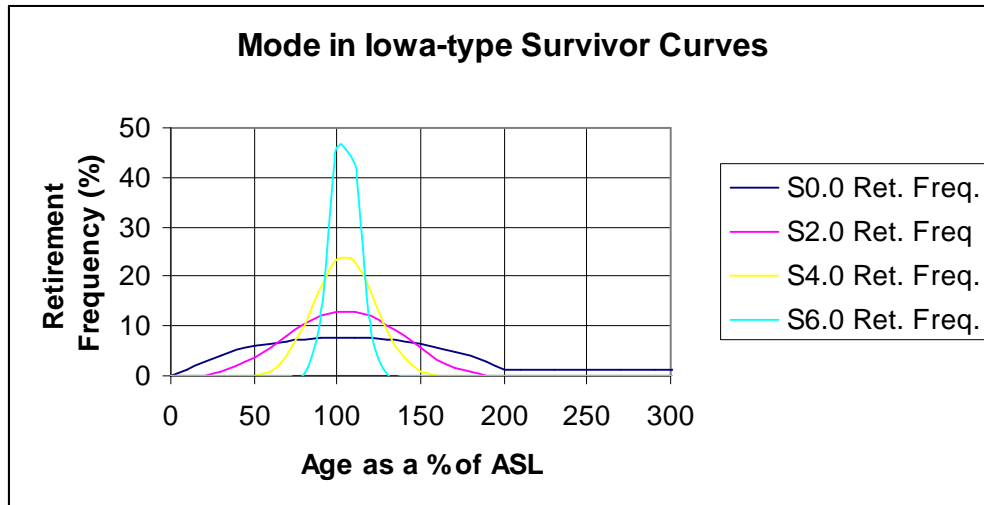
Symmetrically moded (S-type lowa Survivor Curves) (green) – The S-type lowa Survivor Curve is one wherein the property’s retirements are symmetrically distributed about the mode. Mode in statistics is defined as the highest frequency, in this case retirement frequency. Thus, an S-type lowa curve is like a normal curve; however, its shape is not identical to a normal distribution function.

Right moded (R-type lowa Curves) (brown) – the R-type lowa curve has its mode skewed to the right of the property’s average life; therefore, the retirements tend to be distributed later in the property’s life and there are less retirements earlier in the property’s life.

Left moded (L-type lowa Curve) (red) – The L-type lowa curve has its mode skewed to the left of the property’s average life; therefore, the retirements tend to be distributed earlier in the property’s life and there are less retirements later in the property’s life.

In the utility industry, the plant, i.e., mains, treatment and pumping plant equipment tends to have a R-type survival/retirement dispersion as it is designed to provide service over extended periods, requiring little maintenance, and its designers have significant experience in designing and placing such property.

In conjunction with the above described R-, S-, and L-type survival/retirement patterns, Winfrey determines that there were several patterns of the manner in which the retirements’ peakedness occur around the average life. In this case, Winfrey described the peakedness of the property retirements with peakedness enumerations of 0, 1, 2, 3, 4, 5, and 6. The low peakedness numbers 0 and 1 represent low levels of retirements being distributed over the property entire life, while high peakedness numbers, 5 and 6 represent retirement patterns where the majority or all the retirement occur tightly grouped around the property’s average life. Peakedness numbers 2, 3, and 4 are middle of the road, so to speak, in terms of peakedness.



Origin moded (O-type) survivor curve (blue) – Harold Cowles in his 1967 update of Bulletin 125 introduced the O-type survivor curve with the mode of the curve at the origin or at age equal to zero (0) years. This class of lowa curves was over looked by Winfrey possibly because it made little intuitive sense that industrial retirement of property would have their maximum retirement frequency at age equal to zero. However, Cowles felt for completeness they should be included. O-type survivor curves do reflect the survival pattern of intangible assets.

lowa-type survivor curves are parametric, as opposed to formalistic, in that they were derived from empirical survival/retirement data which Winfrey collected. There are lowa curve equations are presented in Bulletin 125; however, in most cases users reference standardized lowa Survivor Curve tables. The lowa-type survivor curves used in this appraisal have been generalized to a service life of 100% of the property's average life. By generalizing the service life to 100% of average life these tables can be used to generate survival and retirement statistics for property of any service life.

It should be apparent that lowa-types survivor curves are valid for any type property as the curves only depict how that property survives and retires about the average life of a group of similar property.

Generalized lowa-type Survivor Curves

As was discussed earlier, most users of the lowa-type survivor curves use standardized tables of lowa curves. The most usable form of these standardized tables are tables which have been generalized to a standard life of 100% of the property's average life. Based on these generalized tables the user can determine the property's remaining life by knowing the lowa-type survivor curve (mode and peakedness characteristics), the property's (group's) service life, and the specific property's (for which the remaining life is desired) age. The following table reflects how the remaining life, as well as its condition, is determined:

Year	Study Date	Age	Iowa Curve	Service Life	Age % of ASL	Iowa Lookup	Iowa Condition	Remaining Life	Total Life	Condition
		years		ASL	%			years	years	%
Input		Calc	Input	Input	Calc	Calc	lookup	Calc	Calc	Calc
1970	2006	35.5	R3.0	25	142	R3.0142	0.066388	1.7	37.2	4.47%
1980	2006	25.5	R3.0	25	102	R3.0102	0.192543	4.8	30.3	15.88%
1990	2006	15.5	R3.0	25	62	R3.0062	0.442050	11.1	26.6	41.62%
2000	2006	5.5	R3.0	25	22	R3.0022	0.787294	19.7	25.2	78.16%
2004	2006	1.5	R3.0	25	6	R3.0006	0.941117	23.5	25.0	94.01%
2005	2006	0.5	R3.0	25	2	R3.0002	0.980320	24.5	25.0	98.00%

The above table was developed with reference to the standardized Iowa Survivor curves contained and represent a R3.0 25-year Iowa curve and life table. The standardized Iowa Curves are located in tab database. In order to reference the proper line of the Iowa Curve data the user looks up that data by reference to the property's age as percent of the service life (age % of ASL column) and the Iowa Survivor curve (Iowa Curve column), combining these two criteria the Iowa Lookup column will get the user to the proper Iowa Curve data.

In the above calculation the Iowa-type survivor curve is R3, the service life of the group is 25 years, and its age is defined by property's accounting records which specifies the investment in property by account (A group in service life terms) and by the year of installation of that property. The age is dependent upon the appraisal year (study date) and the year of placement. It is customary to assume that the property placed in any particular placement year was placed continuously during that year and therefore its age is best represented as if that investment was placed in the middle of the year, i.e., July 1; hence, the adoption of the "mid-year" convention where all property is treated as if placed the mid-year.

Service Life and Survival / Retirement Pattern

The service life and survival/retirement pattern are determined by an analysis of historical survival and retirement experience of the company's property. This historical experience must be adjusted for factor which are known to be impacting the property's service life but may not exhibited their effect on the property's retirement. Here it is important that a distinction is made between industrial property's physical service life and its functional service life. While physically a type of property may be deployed and remain in use for many years, over those years, factors of changing technology, consumers demand and patterns, and even regulation, lessen the property functional life when compared to its physical life. In an industry such as the communications industry, function obsolescence is the primary driver of depreciation.

The following table details the impact of the above described lives on the condition calculations:

Year	Study Date	Age	Iowa Curve	Service Life	Age % of ASL	Iowa Lookup	Iowa Condition	Remaining Life	Total Life	Condition
		years		ASL	%			years	years	%
Input		Calc	Input	Input	Calc	Calc	lookup	Calc	Calc	Calc
1970	2006	35.5	R3.0	30	118	R3.0118	0.131771	4.0	39.5	10.02%
1979	2006	26.5	R3.0	30	88	R3.0088	0.264919	7.9	34.4	23.07%
1981	2006	24.5	R3.0	25	98	R3.0098	0.211333	5.3	29.8	17.74%
1989	2006	16.5	R3.0	25	66	R3.0066	0.411848	10.3	26.8	38.42%
1990	2006	15.5	R3.0	20	78	R3.0078	0.327281	6.5	22.0	29.69%
2000	2006	5.5	R3.0	20	28	R3.0028	0.731331	14.6	20.1	72.67%
2004	2006	1.5	R3.0	20	8	R3.0008	0.921605	18.4	19.9	92.47%
2005	2006	0.5	R3.0	20	3	R3.0003	0.970499	19.4	19.9	97.49%

Statistical Analyses of Industrial Property Retirements

by
Robley Winfrey



**BULLETIN 125
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**ENGINEERING RESEARCH INSTITUTE
IOWA STATE UNIVERSITY • AMES, IOWA**

IOWA CURVES

Iowa-type survivor curves are based on a set of empirical data collected (mainly in the 1930s) for the purpose of statistically predicting future service expectancy (remaining service) for physical properties.

The techniques used and methods applied are exactly analogous to those used by the insurance industry for the purpose of predicting human mortality (life expectancy) when determining appropriate insurance premium rates. The only distinction to be made is that the life insurance companies are investigating the life or longevity characteristics of human beings and the studies which developed the Iowa-type survivor curves were developed to predict the longevity or service life experience for physical, inanimate objects. The seminal statistical analyses for industrial property were conducted under the auspices of the Iowa Research Station now known as Iowa State University and were published in Statistical Analyses of Industrial Property Retirements, Bulletin 125, Engineering Research Institute, Iowa State University.

From the preface to the revised 1967 edition of Bulletin 125:

"With the original publication of Bulletin 125 by the Iowa Engineering Experiment Station in 1935 (now known as the Engineering Research Institute), a significant contribution was made to the practice of industrial property life estimation. This was in the form, first, of a single volume, readily available, which presented in considerable detail the procedures for statistically analyzing historical property retirement data. Secondly, but no less significant, was the presentation of a set of 18 generalized density functions descriptive of industrial property retirement dispersion, mathematically described in terms of the Pearson frequency curve family, but with parameters established empirically from the analysis of a wide range of actual retirement experience.

These curves, the cumulative form of which are commonly referred to as the Iowa-type Survivor Curves, have been used extensively since their introduction and, at the present time, the set is accepted as the standard of industrial property retirement dispersion. Because of the very simple mnemonic coding system which suggests the varying statistical characteristics involved, the Iowa Curves have also become widely used and recognized in the identification or classification of retirement dispersions, even for patterns derived in terms of analytical techniques not using the Curves."

The tables which follow this discussion are the ones used to estimate the remaining life of investment at particular age for an account with a particular service life.

Statistical Analyses of Industrial Property Retirements

by Robley Whitrey

(Revised April, 1967 by Harold
A. Cowles, Professor, Department
of Industrial Engineering)

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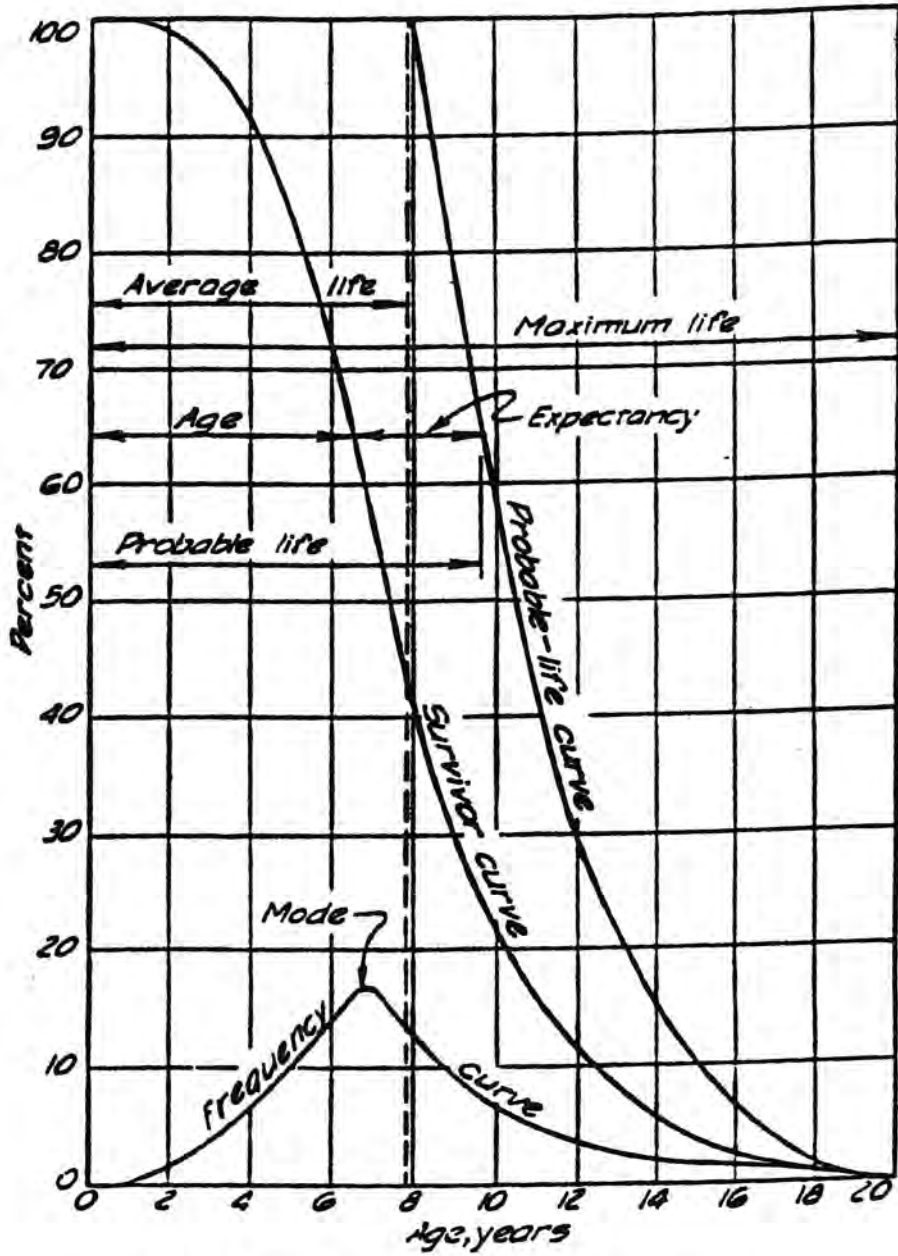


FIG. 1.—A typical survivor curve and its derived curves.

8. The *service life* of a unit is that period of time (or service) extending from the date of its installation to the date of its retirement from service. While the service life of physical property is usually expressed in years it may also be expressed in terms of units of production (screws, wheels, cars, pounds, miles, car-miles), time units of less than a year (months, hours, minutes), or combinations of physical units or services and time (lamp-hours, ton-years).

9. The *probable service life* of an individual unit is that period of time extending from its date of installation to the forecasted date when it probably will be retired from service.

10. The *expectancy of life* of an individual unit is that period of time extending from the observation age (usually the present) to the forecasted date when the unit probably will be retired from service. Age plus expectancy always equals probable life.

11. The *average service life* of a group of individual units is the quotient obtained by dividing the sum of the service lives of all the units by the number of units. The average service life (in years) is equal to the area under the survivor curve in percent-years (or unit-years) divided by 100 percent (or the total number of units).

12. The *probable average service life* of a group of individual units is the average of the probable service lives of the units of the group.

13. The *expectancy of life* of a group of individual units is that period of time extending from the observation age (usually the present) to the average of the forecasted dates when the units probably will be retired. The observation age plus the expectancy always equals the probable average service life.

Note: Service life and average service life are always known quantities since they represent completed service life; probable service life and probable average service life always must be estimated since they are forecasts of uncompleted service.

14. *Maximum life* or *maximum age* is the age of the last unit of a given group to be retired from service; it is also the age at which the survivor curve has a zero ordinate, or zero percent surviving.

15. Property units which are taken out of service for any reason whatsoever are called *retirements*. Retirements may include original units (units of the initial installation) as well as "second-generation" units, that is, replacements (or renewals) which were installed to take the place of the original units as they were removed.

16. *Replacements* are the units put in service to replace retirements.

17. *Renewals* are replacements "in kind" which have exactly the same life characteristics as the retirements.

18. *Installations* are new units placed in service, not as replacement units, but as additions to the property.

19. All renewals, replacements, and installations are *placements*.

20. *Survivor curves* show the number of units of a given group

which are surviving in service at given ages. The ordinates to the curve give at any particular age the percentage (or the actual number) of the original number which are yet surviving in service. The abscissa is measured in years or other suitable service unit. The *original survivor curve* is the curve drawn through the points calculated from the original data without adjustment. Since this original survivor curve is generally irregular it is smoothed to produce a *smoothed survivor curve*, sometimes referred to as an *adjusted curve*.

Survivor curves have in some publications been referred to as *mortality curves*. However, the term *survivor curve* is used in this report because the curves referred to show the *percent surviving*, not the *percent retired*, and because the term *mortality* suggests human beings and not inanimate objects.

21. A *stub survivor curve* is an incomplete survivor curve; that is, one which does not extend to zero percent surviving because of a lack of retirement data on the longer-lived units.

22. A *probable-life curve* shows the probable average life of the survivors at any age from zero to maximum life.

23. If the percent surviving is read at the beginning of each successive age-interval and the differences in these successive readings plotted at ages corresponding to the midpoints of the intervals, the resulting points form a *frequency curve*, or *distribution curve*. Since the ordinates indicate the percentage of the units retired during each interval, the curve shows in what manner the retirements are distributed over the period from zero age to maximum life.

24. The point on the frequency curve having the highest ordinate is called the *mode*. The year in which the mode occurs is called the *modal year*.

25. A *maximum-life cycle* is a period of time corresponding in length to the maximum life of the units. An industrial property may continue to be operated through several maximum-life cycles of some of the units of which it is composed.

26. An *average-life cycle* is a period of time corresponding in length to the *average life*.

27. If a property is continued in service for a long time and maintained with a constant number of like units of substantially the same potential average life, it will reach a *normal condition* or *stabilized condition*, after which the average age of the units in service and the annual renewals will be constant year after year.

28. *Normal renewals* are the annual renewals after the property group has reached a stabilized condition. Normal renewals, in percent of the original number of units, are equal to 100 percent divided by the average life.

29. *Generalized curves* are those whose ordinates are expressed in percent of the total number of units and whose abscissas (age) are expressed in percent of average life.

30. *Type curves* are those theoretical curves derived by the methods described in this report from a study of actual retirements. They depict typical survivor and frequency curves for industrial property. Actual survivor curves are compared with type survivor curves in the process of determining probable average lives.

MORTALITY TABLES AND CURVES OF HUMAN BEINGS

By a study of population and deaths, life insurance companies have arrived at life tables for human beings of different nationalities. From these life tables the normal death rate and life expectancy for people at different ages can be determined as a basis for life insurance premiums and reserves. Life tables can be prepared from the vital statistics for any desired number of years in combination with census returns. By means of mathematical formulas a life table is adjusted to remove any slight irregularities that may exist in the original data.

Table 1 is the United States life table for white males, based upon deaths for the 10 years from 1901 to 1910. Unlike industrial property units whose average lives are continually being affected by many forces, the human average life and distribution of deaths according to age change very little over several generations. The life curve, however, varies considerably for different races as is illustrated in Fig. 2. The deaths at different ages are shown for the United States by the frequency curves in Fig. 3.

This reference to the United States life tables is made to show the similarity between the life characteristics of human beings and industrial properties. The essential differences are three. First, human beings experience a heavy infant mortality which results in a bi-modal frequency curve, one mode occurring between ages 0 and 1, and the other between ages 75 and 76. Second, the mode at the age-interval 75-76 occurs at a much greater percentage of average life than is usually found with physical property employed in industry. Third, the curves for industrial equipment vary in shape over wide limits while human mortality curves vary relatively little. The Makehamized curve in Fig. 3 is one that has been smoothed. (It does not represent the same group of lives as the lower curves of the figure.)

ANALYZING RETIREMENT DATA

The foregoing section discussed the life tables for humans and the accompanying curves. Similar analyses can be made of the behavior of the physical equipment employed in industry when sufficient information is available. The processes employed for analyzing the retirements of industrial property are not so easily handled as are those employed for mortality data of human beings, nor are the results usually as uniform because of the small number of units observed and the more numerous, less uniform causes of retirement of industrial

SURVIVOR, PROBABLE LIFE AND FREQUENCY CURVES
FOR THE RIGHT-MODAL IOWA TYPE CURVES

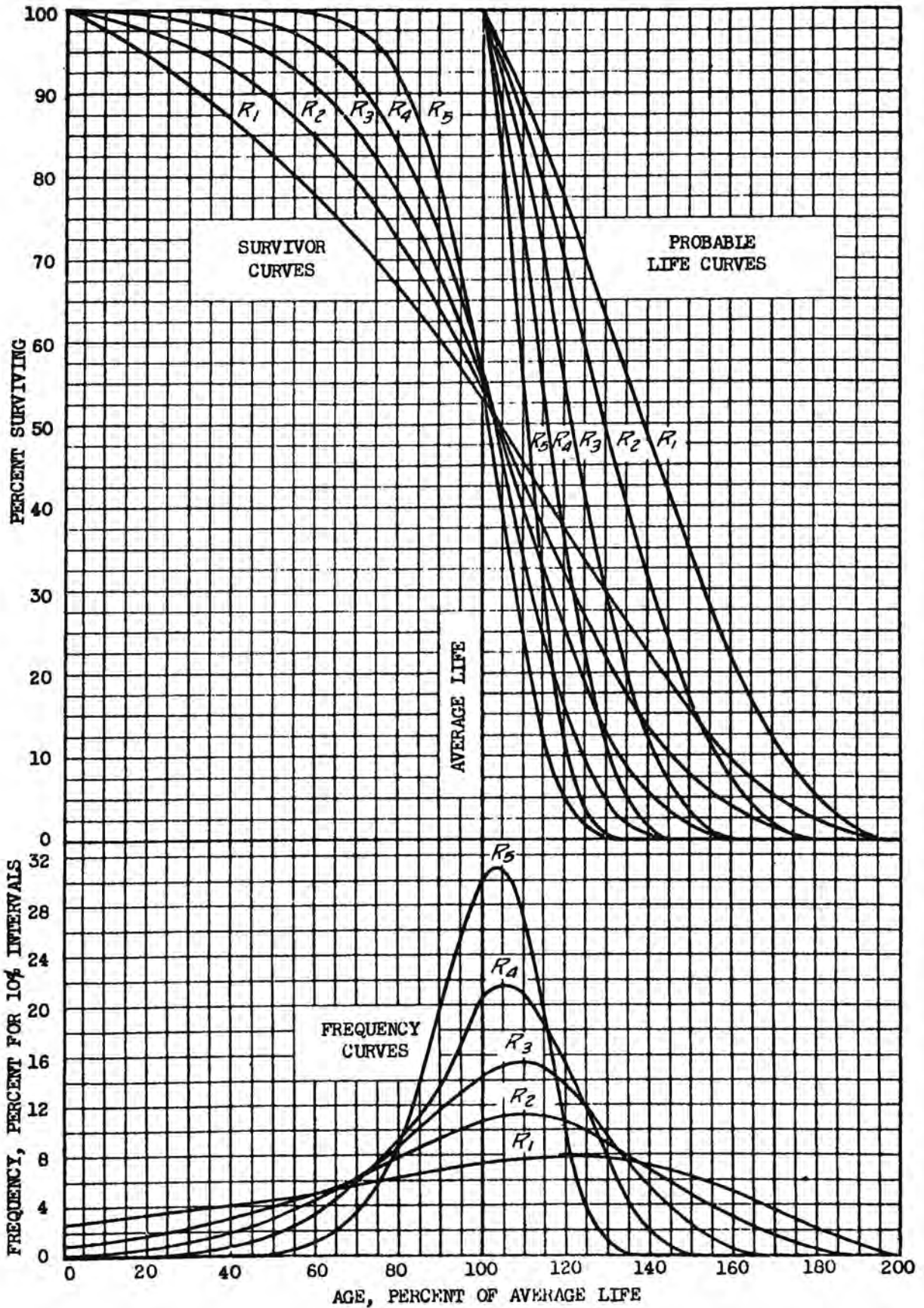


CHART NO. 8

SURVIVOR, PROBABLE LIFE AND FREQUENCY CURVES
FOR THE SYMMETRICAL IOWA TYPE CURVES

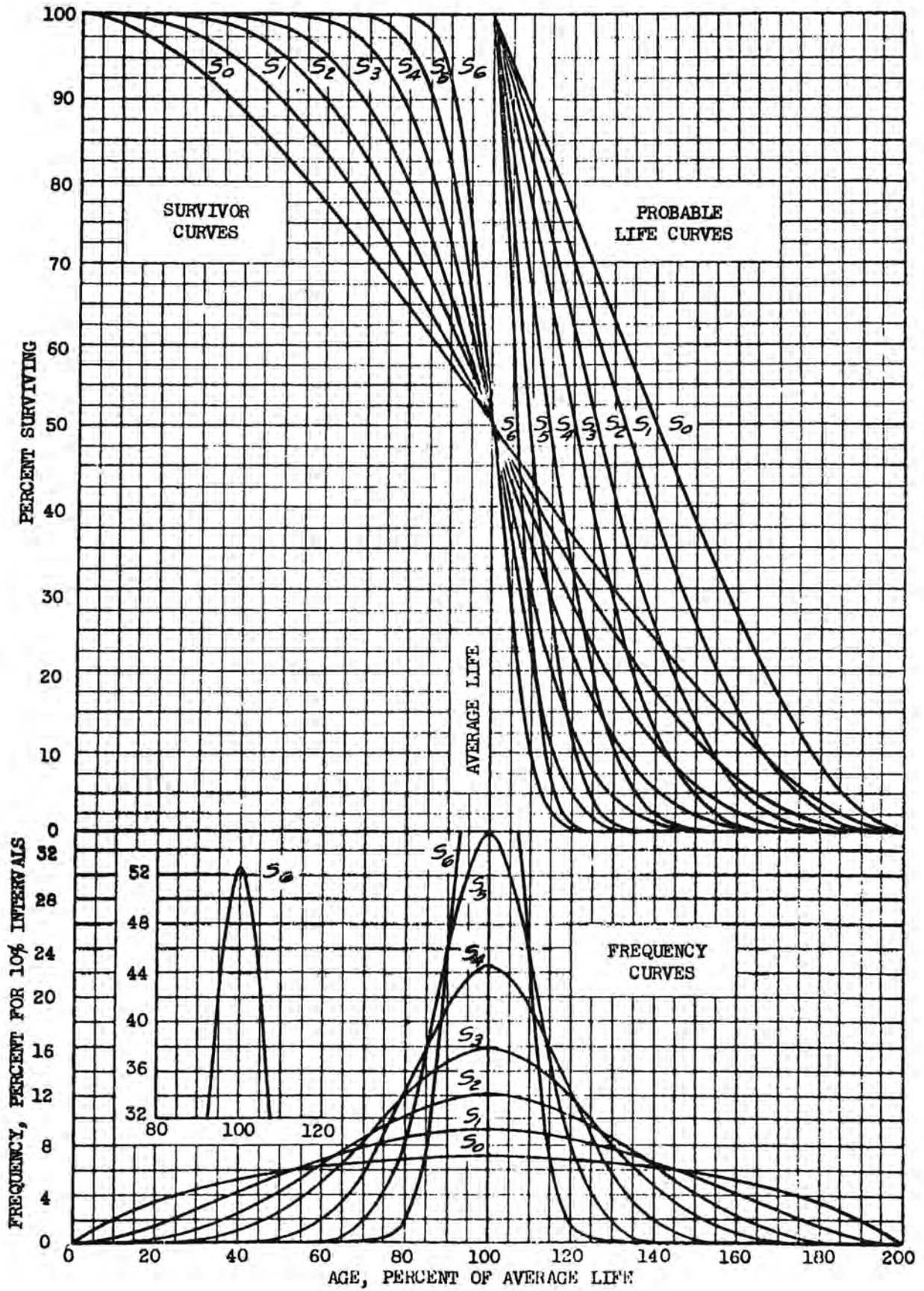
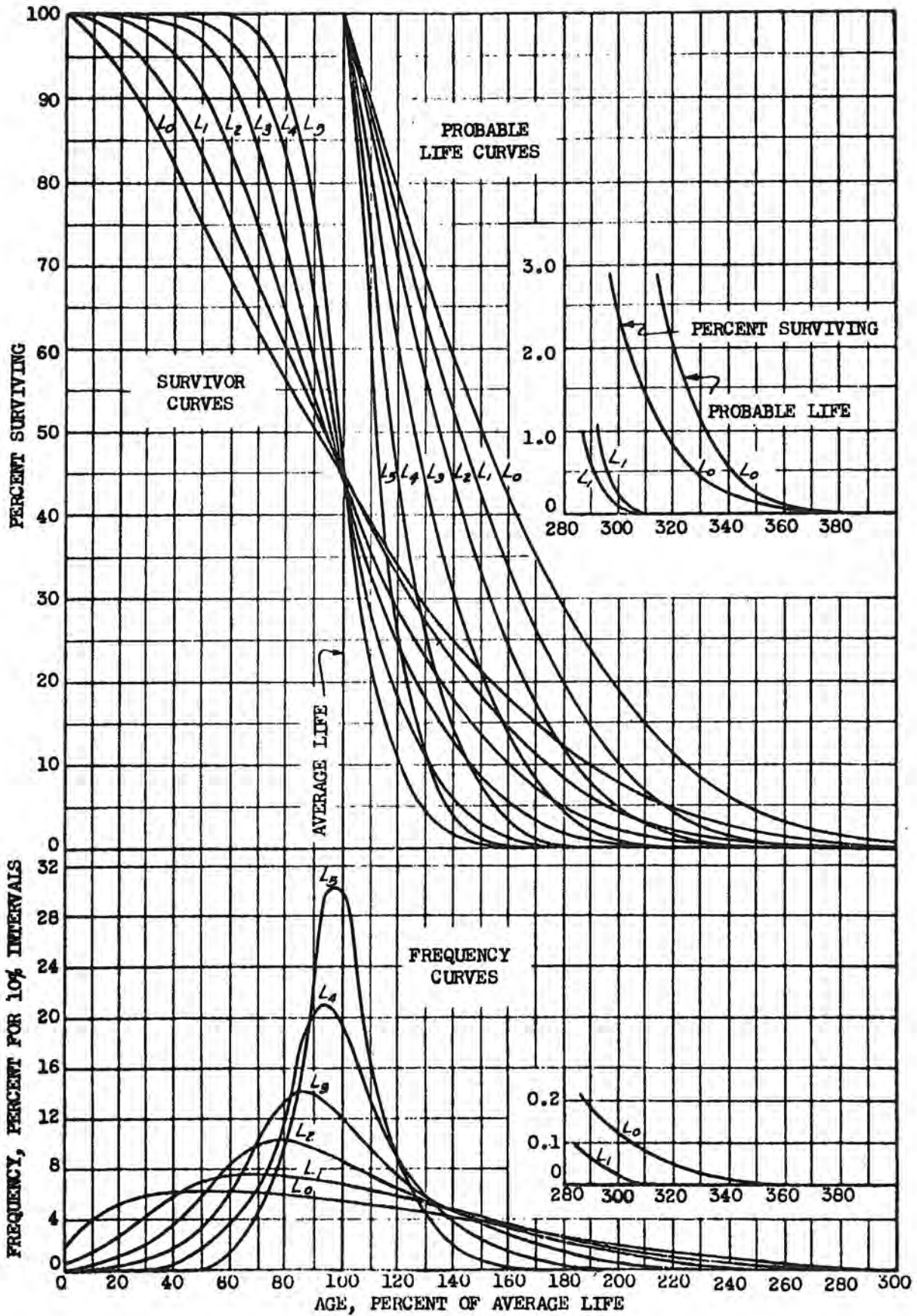
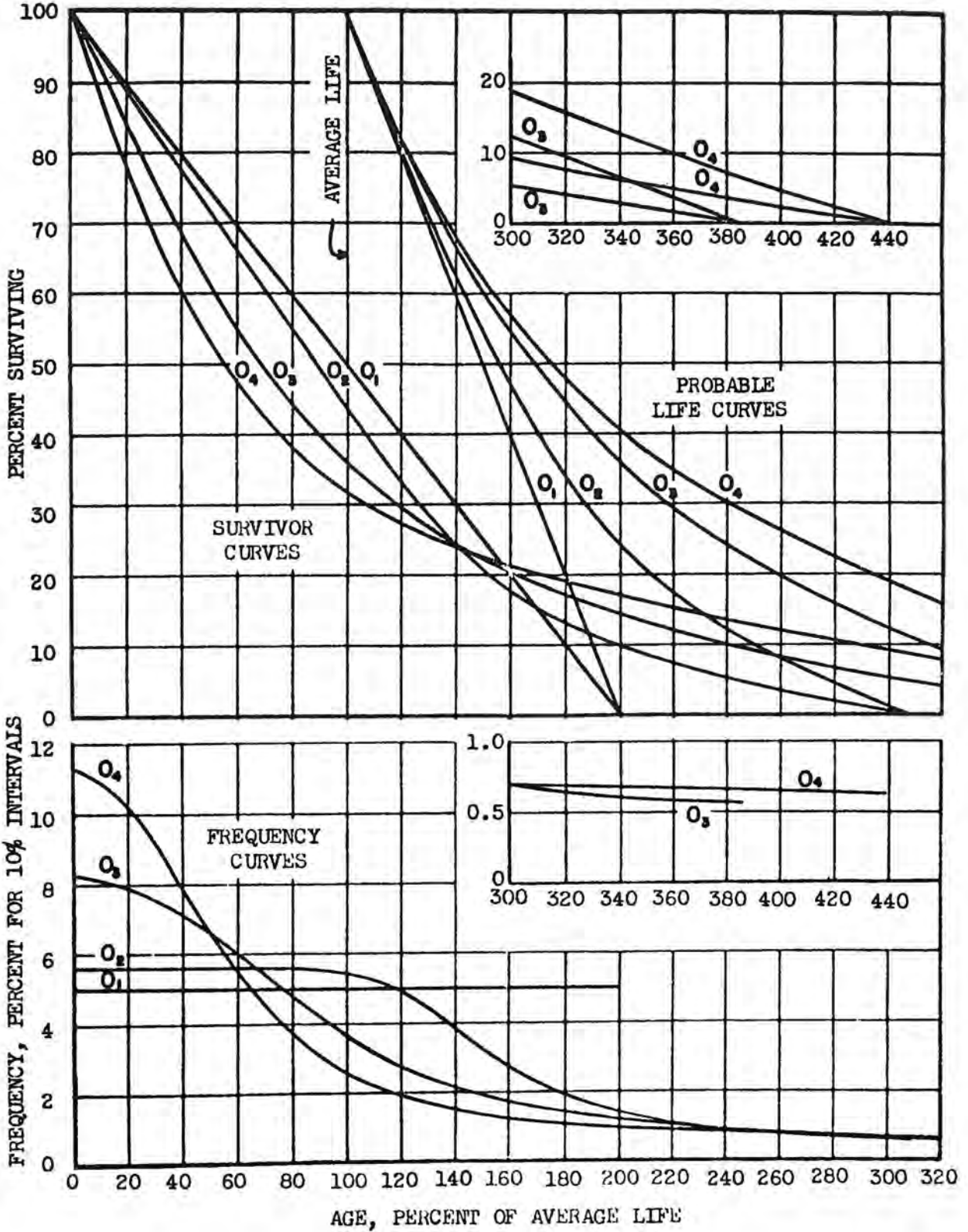


CHART NO. 7

SURVIVOR, PROBABLE LIFE AND FREQUENCY CURVES
FOR THE LEFT-MODAL IOWA TYPE CURVES



SURVIVOR, PROBABLE LIFE AND FREQUENCY CURVES
FOR THE ORIGIN-MODAL TYPE CURVES



Iowa-type Retirement - Survival Tables

Percent Retired, Surviving, Condition, and Depreciation Reserve
as a function of Age as a Percent of Average Service Life

1	2	3	4	5	6	7
Lookup	Curve	Age %	% Ret	% Surv	% Cond	% Depr Resv
R2.0000	R2.0	0	0.0948315	100.0000000	100.0000000	0.0000000
R2.0001	R2.0	1	0.0981016	99.9051685	99.0944462	0.9055538
R2.0002	R2.0	2	0.1014623	99.8070669	98.1913567	1.8086433
R2.0003	R2.0	3	0.1049099	99.7056046	97.2907686	2.7092314
R2.0004	R2.0	4	0.1084509	99.6006947	96.3927202	3.6072798
R2.0005	R2.0	5	0.1120825	99.4922438	95.4972458	4.5027542
R2.0006	R2.0	6	0.1158104	99.3801613	94.6043863	5.3956137
R2.0007	R2.0	7	0.1196318	99.2643509	93.7141762	6.2858238
R2.0008	R2.0	8	0.1235532	99.1447191	92.8266525	7.1733475
R2.0009	R2.0	9	0.1275731	99.0211659	91.9418526	8.0581474
R2.0010	R2.0	10	0.1316938	98.8935928	91.0598126	8.9401874
R2.0011	R2.0	11	0.1359167	98.7618990	90.1805687	9.8194313
R2.0012	R2.0	12	0.1402454	98.6259823	89.3041592	10.6958408
R2.0013	R2.0	13	0.1446791	98.4857369	88.4306173	11.5693827
R2.0014	R2.0	14	0.1492214	98.3410578	87.5599813	12.4400187
R2.0015	R2.0	15	0.1538735	98.1918364	86.6922846	13.3077154
R2.0016	R2.0	16	0.1586370	98.0379629	85.8275662	14.1724338
R2.0017	R2.0	17	0.1635142	97.8793259	84.9658604	15.0341396
R2.0018	R2.0	18	0.1685056	97.7158117	84.1072016	15.8927984
R2.0019	R2.0	19	0.1736164	97.5473061	83.2516279	16.7483721
R2.0020	R2.0	20	0.1788426	97.3736897	82.3991718	17.6008282
R2.0021	R2.0	21	0.1841926	97.1948471	81.5498714	18.4501286
R2.0022	R2.0	22	0.1896649	97.0106545	80.7037592	19.2962408
R2.0023	R2.0	23	0.1952619	96.8209896	79.8608723	20.1391277
R2.0024	R2.0	24	0.2009860	96.6257277	79.0212450	20.9787550
R2.0025	R2.0	25	0.2068378	96.4247417	78.1849127	21.8150873
R2.0026	R2.0	26	0.2128210	96.2179041	77.3519096	22.6480904
R2.0027	R2.0	27	0.2189369	96.0050831	76.5222740	23.4777260
R2.0028	R2.0	28	0.2251892	95.7861462	75.6960373	24.3039627
R2.0029	R2.0	29	0.2315760	95.5609570	74.8732357	25.1267643
R2.0030	R2.0	30	0.2381039	95.3293810	74.0539045	25.9460955
R2.0031	R2.0	31	0.2447710	95.0912771	73.2380800	26.7619200
R2.0032	R2.0	32	0.2515831	94.8465061	72.4257956	27.5742044
R2.0033	R2.0	33	0.2585392	94.5949230	71.6170883	28.3829117
R2.0034	R2.0	34	0.2656450	94.3363838	70.8119927	29.1880073
R2.0035	R2.0	35	0.2728977	94.0707388	70.0105457	29.9894543
R2.0036	R2.0	36	0.2803049	93.7978411	69.2127819	30.7872181
R2.0037	R2.0	37	0.2878657	93.5175362	68.4187384	31.5812616
R2.0038	R2.0	38	0.2955808	93.2296705	67.6284504	32.3715496
R2.0039	R2.0	39	0.3034544	92.9340897	66.8419552	33.1580448
R2.0040	R2.0	40	0.3114920	92.6306353	66.0592899	33.9407101
R2.0041	R2.0	41	0.3196878	92.3191433	65.2808571	34.7191429
R2.0042	R2.0	42	0.3280507	91.9994555	64.5055971	35.4944029
R2.0043	R2.0	43	0.3365783	91.6714048	63.7346439	36.2653561
R2.0044	R2.0	44	0.3452769	91.3348265	62.9676700	37.0323300

Iowa-type Retirement - Survival Tables

Percent Retired, Surviving, Condition, and Depreciation Reserve
as a function of Age as a Percent of Average Service Life

1	2	3	4	5	6	7
Lookup	Curve	Age %	% Ret	% Surv	% Cond	% Depr Resv
R2.0045	R2.0	45	0.3541450	90.9895496	62.2047148	37.7952852
R2.0046	R2.0	46	0.3631840	90.6354046	61.4458170	38.5541830
R2.0047	R2.0	47	0.3723984	90.2722206	60.6910148	39.3089852
R2.0048	R2.0	48	0.3817892	89.8998222	59.9403491	40.0596509
R2.0049	R2.0	49	0.3913574	89.5180330	59.1938582	40.8061418
R2.0050	R2.0	50	0.4011030	89.1266756	58.4515839	41.5484161
R2.0051	R2.0	51	0.4110289	88.7255726	57.7135668	42.2864332
R2.0052	R2.0	52	0.4211368	88.3145437	56.9798470	43.0201530
R2.0053	R2.0	53	0.4314261	87.8934069	56.2504678	43.7495322
R2.0054	R2.0	54	0.4419002	87.4619808	55.5254688	44.4745312
R2.0055	R2.0	55	0.4525547	87.0200808	54.8048959	45.1951041
R2.0056	R2.0	56	0.4633961	86.5675259	54.0887899	45.9112101
R2.0057	R2.0	57	0.4744196	86.1041298	53.3771148	46.6228852
R2.0058	R2.0	58	0.4856272	85.6297102	52.6701531	47.3298469
R2.0059	R2.0	59	0.4970178	85.1440830	51.9677110	48.0322890
R2.0060	R2.0	60	0.5085907	84.6470652	51.2699108	48.7300892
R2.0061	R2.0	61	0.5203457	84.1384745	50.5767999	49.4232001
R2.0062	R2.0	62	0.5322781	83.6181288	49.8884211	50.1115789
R2.0063	R2.0	63	0.5443878	83.0858507	49.2042208	50.7957792
R2.0064	R2.0	64	0.5566711	82.5414629	48.5260449	51.4739551
R2.0065	R2.0	65	0.5691252	81.9847918	47.8521390	52.1478610
R2.0066	R2.0	66	0.5817490	81.4156666	47.1831479	52.8168521
R2.0067	R2.0	67	0.5945339	80.8339176	46.5191188	53.4808812
R2.0068	R2.0	68	0.6074762	80.2393837	45.8600979	54.1399021
R2.0069	R2.0	69	0.6205731	79.6319075	45.2061300	54.7938700
R2.0070	R2.0	70	0.6338187	79.0113344	44.5572619	55.4427381
R2.0071	R2.0	71	0.6471968	78.3775177	43.9135399	56.0864601
R2.0072	R2.0	72	0.6607103	77.7303209	43.2750101	56.7249899
R2.0073	R2.0	73	0.6743469	77.0696106	42.6417151	57.3582849
R2.0074	R2.0	74	0.6880913	76.3952637	42.0137038	57.9862962
R2.0075	R2.0	75	0.7019453	75.7071724	41.3910160	58.6089840
R2.0076	R2.0	76	0.7158861	75.0052271	40.7736988	59.2263012
R2.0077	R2.0	77	0.7299071	74.2893410	40.1617951	59.8382049
R2.0078	R2.0	78	0.7439918	73.5594339	39.5553460	60.4446540
R2.0079	R2.0	79	0.7581263	72.8154421	38.9543939	61.0456061
R2.0080	R2.0	80	0.7722978	72.0573158	38.3589792	61.6410208
R2.0081	R2.0	81	0.7864914	71.2850180	37.7691412	62.2308588
R2.0082	R2.0	82	0.8006802	70.4985266	37.1849198	62.8150802
R2.0083	R2.0	83	0.8148537	69.6978464	36.6063528	63.3936472
R2.0084	R2.0	84	0.8289880	68.8829927	36.0334740	63.9665260
R2.0085	R2.0	85	0.8430577	68.0540047	35.4663181	64.5336819
R2.0086	R2.0	86	0.8570489	67.2109470	34.9049168	65.0950832
R2.0087	R2.0	87	0.8709355	66.3538981	34.3493028	65.6506972
R2.0088	R2.0	88	0.8846855	65.4829626	33.7995038	66.2004962
R2.0089	R2.0	89	0.8982801	64.5982771	33.2555461	66.7444539

Iowa-type Retirement - Survival Tables

Percent Retired, Surviving, Condition, and Depreciation Reserve
as a function of Age as a Percent of Average Service Life

1	2	3	4	5	6	7
Lookup	Curve	Age %	% Ret	% Surv	% Cond	% Depr Resv
R2.0090	R2.0	90	0.9116889	63.6999970	32.7174568	67.2825432
R2.0091	R2.0	91	0.9248881	62.7883081	32.1852560	67.8147440
R2.0092	R2.0	92	0.9378390	61.8634200	31.6589661	68.3410339
R2.0093	R2.0	93	0.9505158	60.9255810	31.1386020	68.8613980
R2.0094	R2.0	94	0.9628930	59.9750652	30.6241779	69.3758221
R2.0095	R2.0	95	0.9749274	59.0121722	30.1157100	69.8842900
R2.0096	R2.0	96	0.9865956	58.0372448	29.6132040	70.3867960
R2.0097	R2.0	97	0.9978571	57.0506492	29.1166680	70.8833320
R2.0098	R2.0	98	1.0086742	56.0527921	28.6261051	71.3738949
R2.0099	R2.0	99	1.0190200	55.0441179	28.1415110	71.8584890
R2.0100	R2.0	100	1.0288558	54.0250979	27.6628840	72.3371160
R2.0101	R2.0	101	1.0381442	52.9962421	27.1902180	72.8097820
R2.0102	R2.0	102	1.0468449	51.9580979	26.7234991	73.2765009
R2.0103	R2.0	103	1.0549312	50.9112530	26.2627111	73.7372889
R2.0104	R2.0	104	1.0623607	49.8563218	25.8078351	74.1921649
R2.0105	R2.0	105	1.0691033	48.7939611	25.3588469	74.6411531
R2.0106	R2.0	106	1.0751200	47.7248578	24.9157200	75.0842800
R2.0107	R2.0	107	1.0803718	46.6497378	24.4784200	75.5215800
R2.0108	R2.0	108	1.0848422	45.5693660	24.0469079	75.9530921
R2.0109	R2.0	109	1.0884819	44.4845238	23.6211450	76.3788550
R2.0110	R2.0	110	1.0912700	43.3960419	23.2010810	76.7989190
R2.0111	R2.0	111	1.0931697	42.3047719	22.7866659	77.2133341
R2.0112	R2.0	112	1.0941701	41.2116022	22.3778369	77.6221631
R2.0113	R2.0	113	1.0942240	40.1174321	21.9745369	78.0254631
R2.0114	R2.0	114	1.0933342	39.0232081	21.5766909	78.4233091
R2.0115	R2.0	115	1.0914621	37.9298739	21.1842289	78.8157711
R2.0116	R2.0	116	1.0885978	36.8384118	20.7970691	79.2029309
R2.0117	R2.0	117	1.0847301	35.7498140	20.4151239	79.5848761
R2.0118	R2.0	118	1.0798369	34.6650839	20.0383019	79.9616981
R2.0119	R2.0	119	1.0739369	33.5852470	19.6665001	80.3334999
R2.0120	R2.0	120	1.0669980	32.5113101	19.2996221	80.7003779
R2.0121	R2.0	121	1.0590372	31.4443121	18.9375479	81.0624521
R2.0122	R2.0	122	1.0501070	30.3852749	18.5801630	81.4198370
R2.0123	R2.0	123	1.0400660	29.3351679	18.2273769	81.7726231
R2.0124	R2.0	124	1.0290709	28.2951019	17.8789959	82.1210041
R2.0125	R2.0	125	1.0170991	27.2660310	17.5349121	82.4650879
R2.0126	R2.0	126	1.0041568	26.2489319	17.1949849	82.8050151
R2.0127	R2.0	127	0.9902881	25.2447751	16.8590529	83.1409471
R2.0128	R2.0	128	0.9755079	24.2544870	16.5269830	83.4730170
R2.0129	R2.0	129	0.9598532	23.2789791	16.1985951	83.8014049
R2.0130	R2.0	130	0.9433670	22.3191259	15.8737270	84.1262730
R2.0131	R2.0	131	0.9260879	21.3757589	15.5522090	84.4477910
R2.0132	R2.0	132	0.9080550	20.4496710	15.2338660	84.7661340
R2.0133	R2.0	133	0.8893190	19.5416160	14.9185150	85.0814850
R2.0134	R2.0	134	0.8699369	18.6522970	14.6059730	85.3940270

Iowa-type Retirement - Survival Tables

Percent Retired, Surviving, Condition, and Depreciation Reserve
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1	2	3	4	5	6	7
Lookup	Curve	Age %	% Ret	% Surv	% Cond	% Depr Resv
R2.0135	R2.0	135	0.8499541	17.7823601	14.2960570	85.7039430
R2.0136	R2.0	136	0.8294290	16.9324060	13.9885750	86.0114250
R2.0137	R2.0	137	0.8084200	16.1029770	13.6833420	86.3166580
R2.0138	R2.0	138	0.7869870	15.2945570	13.3801709	86.6198291
R2.0139	R2.0	139	0.7651829	14.5075700	13.0788760	86.9211240
R2.0140	R2.0	140	0.7430681	13.7423871	12.7792740	87.2207260
R2.0141	R2.0	141	0.7207081	12.9993190	12.4811831	87.5188169
R2.0142	R2.0	142	0.6981599	12.2786109	12.1844341	87.8155659
R2.0143	R2.0	143	0.6754730	11.5804510	11.8888620	88.1111380
R2.0144	R2.0	144	0.6527110	10.9049780	11.5943070	88.4056930
R2.0145	R2.0	145	0.6299220	10.2522670	11.3006270	88.6993730
R2.0146	R2.0	146	0.6071579	9.6223450	11.0076849	88.9923151
R2.0147	R2.0	147	0.5844650	9.0151870	10.7153600	89.2846400
R2.0148	R2.0	148	0.5618890	8.4307220	10.4235460	89.5764540
R2.0149	R2.0	149	0.5394630	7.8688330	10.1321560	89.8678440
R2.0150	R2.0	150	0.5172310	7.3293700	9.8411110	90.1588891
R2.0151	R2.0	151	0.4952170	6.8121390	9.5503610	90.4496390
R2.0152	R2.0	152	0.4734520	6.3169220	9.2598670	90.7401331
R2.0153	R2.0	153	0.4519570	5.8434700	8.9696111	91.0303890
R2.0154	R2.0	154	0.4307510	5.3915130	8.6795980	91.3204020
R2.0155	R2.0	155	0.4098480	4.9607620	8.3898460	91.6101540
R2.0156	R2.0	156	0.3892590	4.5509140	8.1003940	91.8996060
R2.0157	R2.0	157	0.3689940	4.1616550	7.8112940	92.1887060
R2.0158	R2.0	158	0.3490550	3.7926610	7.5226200	92.4773800
R2.0159	R2.0	159	0.3294490	3.4436060	7.2344580	92.7655420
R2.0160	R2.0	160	0.3101780	3.1141570	6.9468990	93.0531010
R2.0161	R2.0	161	0.2912410	2.8039790	6.6600590	93.3399410
R2.0162	R2.0	162	0.2726440	2.5127380	6.3740460	93.6259540
R2.0163	R2.0	163	0.2543900	2.2400940	6.0889820	93.9110180
R2.0164	R2.0	164	0.2364840	1.9857040	5.8049920	94.1950080
R2.0165	R2.0	165	0.2189350	1.7492200	5.5221940	94.4778060
R2.0166	R2.0	166	0.2017570	1.5302850	5.2407130	94.7592870
R2.0167	R2.0	167	0.1849660	1.3285280	4.9606590	95.0393410
R2.0168	R2.0	168	0.1685830	1.1435620	4.6821490	95.3178510
R2.0169	R2.0	169	0.1526310	0.9749790	4.4052860	95.5947140
R2.0170	R2.0	170	0.1371620	0.8223480	4.1301220	95.8698780
R2.0171	R2.0	171	0.1221950	0.6851860	3.8568020	96.1431980
R2.0172	R2.0	172	0.1077830	0.5629910	3.5853840	96.4146160
R2.0173	R2.0	173	0.0939780	0.4552080	3.3159460	96.6840540
R2.0174	R2.0	174	0.0808330	0.3612300	3.0485230	96.9514770
R2.0175	R2.0	175	0.0684150	0.2803970	2.7832120	97.2167880
R2.0176	R2.0	176	0.0567860	0.2119820	2.5201260	97.4798740
R2.0177	R2.0	177	0.0460210	0.1551960	2.2592980	97.7407020
R2.0178	R2.0	178	0.0361913	0.1091750	2.0008840	97.9991160
R2.0179	R2.0	179	0.0273739	0.0729837	1.7451020	98.2548980

Iowa-type Retirement - Survival Tables

Percent Retired, Surviving, Condition, and Depreciation Reserve
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1	2	3	4	5	6	7
Lookup	Curve	Age %	% Ret	% Surv	% Cond	% Depr Resv
R2.5000	R2.5	0	0.0551548	100.0000000	100.0000000	0.0000000
R2.5001	R2.5	1	0.0574713	99.9448452	99.0549097	0.9450903
R2.5002	R2.5	2	0.0598783	99.8873739	98.1116142	1.8883858
R2.5003	R2.5	3	0.0623808	99.8274956	97.1701632	2.8298368
R2.5004	R2.5	4	0.0649805	99.7651148	96.2306089	3.7693911
R2.5005	R2.5	5	0.0676823	99.7001343	95.2930031	4.7069969
R2.5006	R2.5	6	0.0704880	99.6324520	94.3573971	5.6426029
R2.5007	R2.5	7	0.0734014	99.5619640	93.4238472	6.5761528
R2.5008	R2.5	8	0.0764256	99.4885626	92.4924040	7.5075960
R2.5009	R2.5	9	0.0795669	99.4121370	91.5631256	8.4368744
R2.5010	R2.5	10	0.0828257	99.3325701	90.6360693	9.3639307
R2.5011	R2.5	11	0.0862064	99.2497444	89.7112904	10.2887096
R2.5012	R2.5	12	0.0897122	99.1635380	88.7888441	11.2111559
R2.5013	R2.5	13	0.0933485	99.0738258	87.8687897	12.1312103
R2.5014	R2.5	14	0.0971183	98.9804773	86.9511881	13.0488119
R2.5015	R2.5	15	0.1010247	98.8833590	86.0360956	13.9639044
R2.5016	R2.5	16	0.1050710	98.7823343	85.1235743	14.8764257
R2.5017	R2.5	17	0.1092635	98.6772633	84.2136803	15.7863197
R2.5018	R2.5	18	0.1136026	98.5679998	83.3064766	16.6935234
R2.5019	R2.5	19	0.1180954	98.4543972	82.4020252	17.5979748
R2.5020	R2.5	20	0.1227426	98.3363018	81.5003834	18.4996166
R2.5021	R2.5	21	0.1275521	98.2135592	80.6016140	19.3983860
R2.5022	R2.5	22	0.1325226	98.0860071	79.7057791	20.2942209
R2.5023	R2.5	23	0.1376619	97.9534845	78.8129368	21.1870632
R2.5024	R2.5	24	0.1429729	97.8158226	77.9231520	22.0768480
R2.5025	R2.5	25	0.1484576	97.6728497	77.0364828	22.9635172
R2.5026	R2.5	26	0.1541233	97.5243921	76.1529923	23.8470077
R2.5027	R2.5	27	0.1599703	97.3702688	75.2727404	24.7272596
R2.5028	R2.5	28	0.1660032	97.2102985	74.3957863	25.6042137
R2.5029	R2.5	29	0.1722278	97.0442953	73.5221920	26.4778080
R2.5030	R2.5	30	0.1786452	96.8720675	72.6520176	27.3479824
R2.5031	R2.5	31	0.1852608	96.6934223	71.7853222	28.2146778
R2.5032	R2.5	32	0.1920747	96.5081615	70.9221630	29.0778370
R2.5033	R2.5	33	0.1990958	96.3160868	70.0626001	29.9373999
R2.5034	R2.5	34	0.2063245	96.1169910	69.2066917	30.7933083
R2.5035	R2.5	35	0.2137642	95.9106665	68.3544951	31.6455049
R2.5036	R2.5	36	0.2214194	95.6969023	67.5060663	32.4939337
R2.5037	R2.5	37	0.2292928	95.4754829	66.6614609	33.3385391
R2.5038	R2.5	38	0.2373877	95.2461901	65.8207359	34.1792641
R2.5039	R2.5	39	0.2457084	95.0088024	64.9839459	35.0160541
R2.5040	R2.5	40	0.2542592	94.7630940	64.1511440	35.8488560
R2.5041	R2.5	41	0.2630376	94.5088348	63.3223858	36.6776142
R2.5042	R2.5	42	0.2720566	94.2457972	62.4977222	37.5022778
R2.5043	R2.5	43	0.2813111	93.9737406	61.6772060	38.3227940
R2.5044	R2.5	44	0.2908077	93.6924295	60.8608909	39.1391091

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as a function of Age as a Percent of Average Service Life

1	2	3	4	5	6	7
Lookup	Curve	Age %	% Ret	% Surv	% Cond	% Depr Resv
R2.5045	R2.5	45	0.3005543	93.4016218	60.0488248	39.9511752
R2.5046	R2.5	46	0.3105459	93.1010675	59.2410641	40.7589359
R2.5047	R2.5	47	0.3207922	92.7905216	58.4376559	41.5623441
R2.5048	R2.5	48	0.3312959	92.4697294	57.6386509	42.3613491
R2.5049	R2.5	49	0.3420601	92.1384335	56.8441010	43.1558990
R2.5050	R2.5	50	0.3530903	91.7963734	56.0540552	43.9459448
R2.5051	R2.5	51	0.3643885	91.4432831	55.2685661	44.7314339
R2.5052	R2.5	52	0.3759584	91.0788946	54.4876838	45.5123162
R2.5053	R2.5	53	0.3878079	90.7029362	53.7114601	46.2885399
R2.5054	R2.5	54	0.3999405	90.3151283	52.9399471	47.0600529
R2.5055	R2.5	55	0.4123592	89.9151878	52.1731982	47.8268018
R2.5056	R2.5	56	0.4250708	89.5028286	51.4112682	48.5887318
R2.5057	R2.5	57	0.4380798	89.0777578	50.6542120	49.3457880
R2.5058	R2.5	58	0.4513912	88.6396780	49.9020872	50.0979128
R2.5059	R2.5	59	0.4650126	88.1882868	49.1549511	50.8450489
R2.5060	R2.5	60	0.4789476	87.7232742	48.4128661	51.5871339
R2.5061	R2.5	61	0.4932022	87.2443266	47.6758952	52.3241048
R2.5062	R2.5	62	0.5077830	86.7511244	46.9441018	53.0558982
R2.5063	R2.5	63	0.5226945	86.2433414	46.2175550	53.7824450
R2.5064	R2.5	64	0.5379439	85.7206469	45.4963250	54.5036750
R2.5065	R2.5	65	0.5535354	85.1827030	44.7804852	55.2195148
R2.5066	R2.5	66	0.5694743	84.6291676	44.0701108	55.9298892
R2.5067	R2.5	67	0.5857687	84.0596933	43.3652830	56.6347170
R2.5068	R2.5	68	0.6024160	83.4739246	42.6660848	57.3339152
R2.5069	R2.5	69	0.6194267	82.8715086	41.9726019	58.0273981
R2.5070	R2.5	70	0.6368008	82.2520819	41.2849250	58.7150750
R2.5071	R2.5	71	0.6545391	81.6152811	40.6031480	59.3968520
R2.5072	R2.5	72	0.6726418	80.9607420	39.9273682	60.0726318
R2.5073	R2.5	73	0.6911087	80.2881002	39.2576852	60.7423148
R2.5074	R2.5	74	0.7099390	79.5969915	38.5942020	61.4057980
R2.5075	R2.5	75	0.7291259	78.8870525	37.9370279	62.0629721
R2.5076	R2.5	76	0.7486620	78.1579266	37.2862740	62.7137260
R2.5077	R2.5	77	0.7685376	77.4092646	36.6420512	63.3579488
R2.5078	R2.5	78	0.7887430	76.6407270	36.0044770	63.9955230
R2.5079	R2.5	79	0.8092565	75.8519840	35.3736682	64.6263318
R2.5080	R2.5	80	0.8300667	75.0427275	34.7497439	65.2502561
R2.5081	R2.5	81	0.8511477	74.2126608	34.1328259	65.8671741
R2.5082	R2.5	82	0.8724718	73.3615131	33.5230379	66.4769621
R2.5083	R2.5	83	0.8940096	72.4890413	32.9204998	67.0795002
R2.5084	R2.5	84	0.9157238	71.5950317	32.3253360	67.6746640
R2.5085	R2.5	85	0.9375753	70.6793079	31.7376659	68.2623341
R2.5086	R2.5	86	0.9595194	69.7417326	31.1576109	68.8423891
R2.5087	R2.5	87	0.9815073	68.7822132	30.5852881	69.4147119
R2.5088	R2.5	88	1.0034790	67.8007059	30.0208130	69.9791870
R2.5089	R2.5	89	1.0253773	66.7972269	29.4642980	70.5357020

Iowa-type Retirement - Survival Tables

Percent Retired, Surviving, Condition, and Depreciation Reserve
as a function of Age as a Percent of Average Service Life

1	2	3	4	5	6	7
Lookup	Curve	Age %	% Ret	% Surv	% Cond	% Depr Resv
R2.5090	R2.5	90	1.0471344	65.7718496	28.9158480	71.0841520
R2.5091	R2.5	91	1.0686831	64.7247152	28.3755679	71.6244321
R2.5092	R2.5	92	1.0899420	63.6560321	27.8435540	72.1564460
R2.5093	R2.5	93	1.1108289	62.5660901	27.3198969	72.6801031
R2.5094	R2.5	94	1.1312651	61.4552612	26.8046770	73.1953230
R2.5095	R2.5	95	1.1511522	60.3239961	26.2979729	73.7020271
R2.5096	R2.5	96	1.1704039	59.1728439	25.7998481	74.2001519
R2.5097	R2.5	97	1.1889191	58.0024400	25.3103621	74.6896379
R2.5098	R2.5	98	1.2065949	56.8135209	24.8295610	75.1704390
R2.5099	R2.5	99	1.2233358	55.6069260	24.3574791	75.6425209
R2.5100	R2.5	100	1.2390403	54.3835902	23.8941431	76.1058569
R2.5101	R2.5	101	1.2536021	53.1445499	23.4395671	76.5604329
R2.5102	R2.5	102	1.2669158	51.8909478	22.9937501	77.0062499
R2.5103	R2.5	103	1.2788939	50.6240320	22.5566781	77.4433219
R2.5104	R2.5	104	1.2894273	49.3451381	22.1283281	77.8716719
R2.5105	R2.5	105	1.2984328	48.0557108	21.7086580	78.2913420
R2.5106	R2.5	106	1.3058210	46.7572780	21.2976141	78.7023859
R2.5107	R2.5	107	1.3115058	45.4514570	20.8951299	79.1048701
R2.5108	R2.5	108	1.3154220	44.1399512	20.5011189	79.4988811
R2.5109	R2.5	109	1.3175020	42.8245292	20.1154850	79.8845150
R2.5110	R2.5	110	1.3176890	41.5070272	19.7381129	80.2618871
R2.5111	R2.5	111	1.3159404	40.1893382	19.3688741	80.6311259
R2.5112	R2.5	112	1.3122248	38.8733978	19.0076220	80.9923780
R2.5113	R2.5	113	1.3065191	37.5611730	18.6541979	81.3458021
R2.5114	R2.5	114	1.2988228	36.2546539	18.3084259	81.6915741
R2.5115	R2.5	115	1.2891360	34.9558311	17.9701180	82.0298820
R2.5116	R2.5	116	1.2774830	33.6666951	17.6390679	82.3609321
R2.5117	R2.5	117	1.2638931	32.3892121	17.3150611	82.6849389
R2.5118	R2.5	118	1.2484150	31.1253190	16.9978631	83.0021369
R2.5119	R2.5	119	1.2311139	29.8769040	16.6872311	83.3127689
R2.5120	R2.5	120	1.2120590	28.6457901	16.3829119	83.6170881
R2.5121	R2.5	121	1.1913381	27.4337311	16.0846400	83.9153600
R2.5122	R2.5	122	1.1690731	26.2423930	15.7921439	84.2078561
R2.5123	R2.5	123	1.1452968	25.0733199	15.5051580	84.4948420
R2.5124	R2.5	124	1.1201971	23.9280231	15.2233681	84.7766319
R2.5125	R2.5	125	1.0938761	22.8078260	14.9465010	85.0534990
R2.5126	R2.5	126	1.0664589	21.7139499	14.6742671	85.3257329
R2.5127	R2.5	127	1.0380819	20.6474910	14.4063790	85.5936210
R2.5128	R2.5	128	1.0088780	19.6094091	14.1425540	85.8574460
R2.5129	R2.5	129	0.9789822	18.6005311	13.8825150	86.1174850
R2.5130	R2.5	130	0.9485328	17.6215489	13.6259940	86.3740060
R2.5131	R2.5	131	0.9176611	16.6730161	13.3727360	86.6272640
R2.5132	R2.5	132	0.8864870	15.7553550	13.1224999	86.8775001
R2.5133	R2.5	133	0.8551400	14.8688680	12.8750581	87.1249419
R2.5134	R2.5	134	0.8237340	14.0137280	12.6302040	87.3697960

Iowa-type Retirement - Survival Tables

Percent Retired, Surviving, Condition, and Depreciation Reserve
as a function of Age as a Percent of Average Service Life

1	2	3	4	5	6	7
Lookup	Curve	Age %	% Ret	% Surv	% Cond	% Depr Resv
R2.5135	R2.5	135	0.7923711	13.1899940	12.3877521	87.6122479
R2.5136	R2.5	136	0.7611500	12.3976229	12.1475360	87.8524640
R2.5137	R2.5	137	0.7301579	11.6364729	11.9094091	88.0905909
R2.5138	R2.5	138	0.6994760	10.9063150	11.6732490	88.3267510
R2.5139	R2.5	139	0.6691670	10.2068390	11.4389530	88.5610470
R2.5140	R2.5	140	0.6392890	9.5376720	11.2064340	88.7935660
R2.5141	R2.5	141	0.6098980	8.8983830	10.9756200	89.0243800
R2.5142	R2.5	142	0.5810320	8.2884851	10.7464550	89.2535450
R2.5143	R2.5	143	0.5527210	7.7074530	10.5188921	89.4811079
R2.5144	R2.5	144	0.5249980	7.1547320	10.2928760	89.7071240
R2.5145	R2.5	145	0.4978830	6.6297340	10.0683579	89.9316421
R2.5146	R2.5	146	0.4713970	6.1318510	9.8452730	90.1547270
R2.5147	R2.5	147	0.4455530	5.6604540	9.6235380	90.3764620
R2.5148	R2.5	148	0.4203759	5.2149010	9.4030380	90.5969620
R2.5149	R2.5	149	0.3958700	4.7945250	9.1836420	90.8163580
R2.5150	R2.5	150	0.3720580	4.3986550	8.9651520	91.0348480
R2.5151	R2.5	151	0.3489550	4.0265970	8.7473331	91.2526670
R2.5152	R2.5	152	0.3265810	3.6776420	8.5298860	91.4701140
R2.5153	R2.5	153	0.3049580	3.3510610	8.3124470	91.6875531
R2.5154	R2.5	154	0.2841100	3.0461030	8.0945830	91.9054170
R2.5155	R2.5	155	0.2640620	2.7619930	7.8757930	92.1242070
R2.5156	R2.5	156	0.2448380	2.4979310	7.6555050	92.3444950
R2.5157	R2.5	157	0.2264680	2.2530930	7.4330760	92.5669240
R2.5158	R2.5	158	0.2089740	2.0266250	7.2078220	92.7921780
R2.5159	R2.5	159	0.1923820	1.8176510	6.9790150	93.0209850
R2.5160	R2.5	160	0.1767130	1.6252690	6.7459320	93.2540680
R2.5161	R2.5	161	0.1619790	1.4485560	6.5078890	93.4921110
R2.5162	R2.5	162	0.1481900	1.2865770	6.2642780	93.7357220
R2.5163	R2.5	163	0.1353470	1.1383870	6.0146450	93.9853550
R2.5164	R2.5	164	0.1234370	1.0030400	5.7587730	94.2412270
R2.5165	R2.5	165	0.1124400	0.8796030	5.4967510	94.5032490
R2.5166	R2.5	166	0.1023100	0.7671630	5.2291050	94.7708950
R2.5167	R2.5	167	0.0929890	0.6648530	4.9568360	95.0431640
R2.5168	R2.5	168	0.0843740	0.5718640	4.6815480	95.3184520
R2.5169	R2.5	169	0.0763160	0.4874900	4.4052840	95.5947160
R2.5170	R2.5	170	0.0685810	0.4111740	4.1301250	95.8698750
R2.5171	R2.5	171	0.0610970	0.3425930	3.8568110	96.1431890
R2.5172	R2.5	172	0.0538920	0.2814960	3.5853870	96.4146130
R2.5173	R2.5	173	0.0469890	0.2276040	3.3159430	96.6840570
R2.5174	R2.5	174	0.0404160	0.1806150	3.0485420	96.9514580
R2.5175	R2.5	175	0.0342080	0.1401990	2.7832260	97.2167740
R2.5176	R2.5	176	0.0283930	0.1059910	2.5201240	97.4798760
R2.5177	R2.5	177	0.0230100	0.0775980	2.2592850	97.7407150
R2.5178	R2.5	178	0.0181160	0.0545880	2.0008610	97.9991390
R2.5179	R2.5	179	0.0136670	0.0364720	1.7451220	98.2548780

Iowa-type Retirement - Survival Tables

Percent Retired, Surviving, Condition, and Depreciation Reserve
as a function of Age as a Percent of Average Service Life

1	2	3	4	5	6	7
Lookup	Curve	Age %	% Ret	% Surv	% Cond	% Depr Resv
R2.5180	R2.5	180	0.0098240	0.0228050	1.4924140	98.5075860
R2.5181	R2.5	181	0.0065460	0.0129810	1.2434710	98.7565290
R2.5182	R2.5	182	0.0038930	0.0064350	0.9997670	99.0002330
R2.5183	R2.5	183	0.0019010	0.0025420	0.7651460	99.2348540
R2.5184	R2.5	184	0.0006080	0.0006410	0.5514820	99.4485180
R2.5185	R2.5	185	0.0000330	0.0000330	0.5000000	99.5000000
R2.5186	R2.5	186	0.0000000	0.0000000	0.0000000	100.0000000

Iowa-type Retirement - Survival Tables

Percent Retired, Surviving, Condition, and Depreciation Reserve
as a function of Age as a Percent of Average Service Life

1	2	3	4	5	6	7
Lookup	Curve	Age %	% Ret	% Surv	% Cond	% Depr Resv
R3.0000	R3.0	0	0.0154791	100.0000000	100.0000000	0.0000000
R3.0001	R3.0	1	0.0168400	99.9845209	99.0154038	0.9845962
R3.0002	R3.0	2	0.0182953	99.9676809	98.0319996	1.9680004
R3.0003	R3.0	3	0.0198507	99.9493856	97.0498524	2.9501476
R3.0004	R3.0	4	0.0215111	99.9295349	96.0690317	3.9309683
R3.0005	R3.0	5	0.0232811	99.9080238	95.0896082	4.9103918
R3.0006	R3.0	6	0.0251655	99.8847427	94.1116552	5.8883448
R3.0007	R3.0	7	0.0271702	99.8595772	93.1352463	6.8647537
R3.0008	R3.0	8	0.0292997	99.8324070	92.1604576	7.8395424
R3.0009	R3.0	9	0.0315600	99.8031073	91.1873674	8.8126326
R3.0010	R3.0	10	0.0339584	99.7715473	90.2160540	9.7839460
R3.0011	R3.0	11	0.0364952	99.7375889	89.2465992	10.7534008
R3.0012	R3.0	12	0.0391798	99.7010937	88.2790852	11.7209148
R3.0013	R3.0	13	0.0420189	99.6619139	87.3135939	12.6864061
R3.0014	R3.0	14	0.0450144	99.6198950	86.3502102	13.6497898
R3.0015	R3.0	15	0.0481758	99.5748806	85.3890209	14.6109791
R3.0016	R3.0	16	0.0515060	99.5267048	84.4301109	15.5698891
R3.0017	R3.0	17	0.0550118	99.4751988	83.4735680	16.5264320
R3.0018	R3.0	18	0.0586996	99.4201870	82.5194798	17.4805202
R3.0019	R3.0	19	0.0625744	99.3614874	81.5679340	18.4320660
R3.0020	R3.0	20	0.0666428	99.2989130	80.6190205	19.3809795
R3.0021	R3.0	21	0.0709104	99.2322702	79.6728268	20.3271732
R3.0022	R3.0	22	0.0753794	99.1613598	78.7294426	21.2705574
R3.0023	R3.0	23	0.0800638	99.0859804	77.7889566	22.2110434
R3.0024	R3.0	24	0.0849600	99.0059166	76.8514566	23.1485434
R3.0025	R3.0	25	0.0900774	98.9209566	75.9170332	24.0829668
R3.0026	R3.0	26	0.0954256	98.8308792	74.9857712	25.0142288
R3.0027	R3.0	27	0.1010027	98.7354536	74.0577602	25.9422398
R3.0028	R3.0	28	0.1068191	98.6344509	73.1330843	26.8669157
R3.0029	R3.0	29	0.1128788	98.5276318	72.2118292	27.7881708
R3.0030	R3.0	30	0.1191874	98.4147530	71.2940807	28.7059193
R3.0031	R3.0	31	0.1257477	98.2955656	70.3799210	29.6200790
R3.0032	R3.0	32	0.1325683	98.1698179	69.4694319	30.5305681
R3.0033	R3.0	33	0.1396523	98.0372496	68.5626936	31.4373064
R3.0034	R3.0	34	0.1470041	97.8975973	67.6597862	32.3402138
R3.0035	R3.0	35	0.1546307	97.7505932	66.7607861	33.2392139
R3.0036	R3.0	36	0.1625337	97.5959625	65.8657694	34.1342306
R3.0037	R3.0	37	0.1707211	97.4334288	64.9748087	35.0251913
R3.0038	R3.0	38	0.1791944	97.2627077	64.0879793	35.9120207
R3.0039	R3.0	39	0.1879616	97.0835133	63.2053480	36.7946520
R3.0040	R3.0	40	0.1970244	96.8955517	62.3269858	37.6730142
R3.0041	R3.0	41	0.2063894	96.6985273	61.4529600	38.5470400
R3.0042	R3.0	42	0.2160606	96.4921379	60.5833340	39.4166660
R3.0043	R3.0	43	0.2260437	96.2760773	59.7181711	40.2818289
R3.0044	R3.0	44	0.2363405	96.0500336	58.8575339	41.1424661

Iowa-type Retirement - Survival Tables

Percent Retired, Surviving, Condition, and Depreciation Reserve
as a function of Age as a Percent of Average Service Life

1	2	3	4	5	6	7
Lookup	Curve	Age %	% Ret	% Surv	% Cond	% Depr Resv
R3.0045	R3.0	45	0.2469616	95.8136931	58.0014839	41.9985161
R3.0046	R3.0	46	0.2579089	95.5667315	57.1500778	42.8499222
R3.0047	R3.0	47	0.2691869	95.3088226	56.3033738	43.6966262
R3.0048	R3.0	48	0.2808028	95.0396357	55.4614301	44.5385699
R3.0049	R3.0	49	0.2927637	94.7588329	54.6243000	45.3757000
R3.0050	R3.0	50	0.3050775	94.4660692	53.7920389	46.2079611
R3.0051	R3.0	51	0.3177452	94.1609917	52.9647021	47.0352979
R3.0052	R3.0	52	0.3307829	93.8432465	52.1423440	47.8576560
R3.0053	R3.0	53	0.3441897	93.5124636	51.3250179	48.6749821
R3.0054	R3.0	54	0.3579797	93.1682739	50.5127802	49.4872198
R3.0055	R3.0	55	0.3721629	92.8102942	49.7056861	50.2943139
R3.0056	R3.0	56	0.3867464	92.4381313	48.9037910	51.0962090
R3.0057	R3.0	57	0.4017400	92.0513849	48.1071558	51.8928442
R3.0058	R3.0	58	0.4171553	91.6496449	47.3158379	52.6841621
R3.0059	R3.0	59	0.4330063	91.2324896	46.5299010	53.4700990
R3.0060	R3.0	60	0.4493046	90.7994833	45.7494102	54.2505898
R3.0061	R3.0	61	0.4660597	90.3501787	44.9744310	55.0255690
R3.0062	R3.0	62	0.4832878	89.8841190	44.2050362	55.7949638
R3.0063	R3.0	63	0.5010013	89.4008312	43.4412990	56.5587010
R3.0064	R3.0	64	0.5192156	88.8998299	42.6832981	57.3167019
R3.0065	R3.0	65	0.5379458	88.3806143	41.9311161	58.0688839
R3.0066	R3.0	66	0.5572013	87.8426685	41.1848378	58.8151622
R3.0067	R3.0	67	0.5770016	87.2854672	40.4445572	59.5554428
R3.0068	R3.0	68	0.5973559	86.7084656	39.7103682	60.2896318
R3.0069	R3.0	69	0.6182804	86.1111097	38.9823709	61.0176291
R3.0070	R3.0	70	0.6397857	85.4928293	38.2606740	61.7393260
R3.0071	R3.0	71	0.6618805	84.8530436	37.5453868	62.4546132
R3.0072	R3.0	72	0.6845751	84.1911631	36.8366242	63.1633758
R3.0073	R3.0	73	0.7078676	83.5065880	36.1345072	63.8654928
R3.0074	R3.0	74	0.7317868	82.7987204	35.4391561	64.5608439
R3.0075	R3.0	75	0.7563066	82.0669336	34.7507062	65.2492938
R3.0076	R3.0	76	0.7814388	81.3106270	34.0692878	65.9307122
R3.0077	R3.0	77	0.8071690	80.5291882	33.3950372	66.6049628
R3.0078	R3.0	78	0.8334932	79.7220192	32.7280932	67.2719068
R3.0079	R3.0	79	0.8603878	78.8885260	32.0685968	67.9314032
R3.0080	R3.0	80	0.8878355	78.0281382	31.4166920	68.5833080
R3.0081	R3.0	81	0.9158049	77.1403027	30.7725229	69.2274771
R3.0082	R3.0	82	0.9442616	76.2244978	30.1362350	69.8637650
R3.0083	R3.0	83	0.9731655	75.2802362	29.5079711	70.4920289
R3.0084	R3.0	84	1.0024595	74.3070707	28.8878751	71.1121249
R3.0085	R3.0	85	1.0320921	73.3046112	28.2760870	71.7239130
R3.0086	R3.0	86	1.0619917	72.2725191	27.6727450	72.3272550
R3.0087	R3.0	87	1.0920782	71.2105274	27.0779829	72.9220171
R3.0088	R3.0	88	1.1222725	70.1184492	26.4919291	73.5080709
R3.0089	R3.0	89	1.1524744	68.9961767	25.9147060	74.0852940

Iowa-type Retirement - Survival Tables

Percent Retired, Surviving, Condition, and Depreciation Reserve
as a function of Age as a Percent of Average Service Life

1	2	3	4	5	6	7
Lookup	Curve	Age %	% Ret	% Surv	% Cond	% Depr Resv
R3.0090	R3.0	90	1.1825809	67.8437023	25.3464310	74.6535690
R3.0091	R3.0	91	1.2124787	66.6611214	24.7872109	75.2127891
R3.0092	R3.0	92	1.2420444	65.4486427	24.2371471	75.7628529
R3.0093	R3.0	93	1.2711425	64.2065983	23.6963310	76.3036690
R3.0094	R3.0	94	1.2996359	62.9354558	23.1648400	76.8351600
R3.0095	R3.0	95	1.3273778	61.6358199	22.6427441	77.3572559
R3.0096	R3.0	96	1.3542113	60.3084421	22.1301019	77.8698981
R3.0097	R3.0	97	1.3799820	58.9542308	21.6269579	78.3730421
R3.0098	R3.0	98	1.4045148	57.5742488	21.1333439	78.8666561
R3.0099	R3.0	99	1.4276528	56.1697340	20.6492770	79.3507230
R3.0100	R3.0	100	1.4492231	54.7420812	20.1747630	79.8252370
R3.0101	R3.0	101	1.4690599	53.2928581	19.7097900	80.2902100
R3.0102	R3.0	102	1.4869881	51.8237982	19.2543340	80.7456660
R3.0103	R3.0	103	1.5028572	50.3368101	18.8083510	81.1916490
R3.0104	R3.0	104	1.5164928	48.8339529	18.3717880	81.6282120
R3.0105	R3.0	105	1.5277629	47.3174601	17.9445670	82.0554330
R3.0106	R3.0	106	1.5365224	45.7896972	17.5266011	82.4733989
R3.0107	R3.0	107	1.5426388	44.2531748	17.1177840	82.8822160
R3.0108	R3.0	108	1.5460029	42.7105360	16.7179930	83.2820070
R3.0109	R3.0	109	1.5465211	41.1645331	16.3270869	83.6729131
R3.0110	R3.0	110	1.5441080	39.6180120	15.9449101	84.0550899
R3.0111	R3.0	111	1.5387101	38.0739040	15.5712870	84.4287130
R3.0112	R3.0	112	1.5302810	36.5351939	15.2060260	84.7939740
R3.0113	R3.0	113	1.5188141	35.0049129	14.8489180	85.1510820
R3.0114	R3.0	114	1.5043109	33.4860988	14.4997360	85.5002640
R3.0115	R3.0	115	1.4868099	31.9817879	14.1582340	85.8417660
R3.0116	R3.0	116	1.4663680	30.4949780	13.8241530	86.1758470
R3.0117	R3.0	117	1.4430571	29.0286100	13.4972171	86.5027829
R3.0118	R3.0	118	1.4169929	27.5855529	13.1771280	86.8228720
R3.0119	R3.0	119	1.3882911	26.1685600	12.8635780	87.1364220
R3.0120	R3.0	120	1.3571188	24.7802689	12.5562360	87.4437640
R3.0121	R3.0	121	1.3236401	23.4231501	12.2547650	87.7452350
R3.0122	R3.0	122	1.2880390	22.0995100	11.9588110	88.0411890
R3.0123	R3.0	123	1.2505269	20.8114710	11.6680059	88.3319941
R3.0124	R3.0	124	1.2113230	19.5609441	11.3819740	88.6180260
R3.0125	R3.0	125	1.1706541	18.3496211	11.1003320	88.8996680
R3.0126	R3.0	126	1.1287601	17.1789670	10.8226880	89.1773120
R3.0127	R3.0	127	1.0858769	16.0502069	10.5486490	89.4513510
R3.0128	R3.0	128	1.0422470	14.9643300	10.2778220	89.7221780
R3.0129	R3.0	129	0.9981119	13.9220830	10.0098190	89.9901810
R3.0130	R3.0	130	0.9536992	12.9239711	9.7442570	90.2557430
R3.0131	R3.0	131	0.9092329	11.9702719	9.4807680	90.5192320
R3.0132	R3.0	132	0.8649200	11.0610390	9.2190000	90.7810000
R3.0133	R3.0	133	0.8209611	10.1961190	8.9586190	91.0413810
R3.0134	R3.0	134	0.7775309	9.3751580	8.6993200	91.3006800

Iowa-type Retirement - Survival Tables

Percent Retired, Surviving, Condition, and Depreciation Reserve
as a function of Age as a Percent of Average Service Life

1	2	3	4	5	6	7
Lookup	Curve	Age %	% Ret	% Surv	% Cond	% Depr Resv
R3.0135	R3.0	135	0.7347881	8.5976270	8.4408310	91.5591691
R3.0136	R3.0	136	0.6928700	7.8628390	8.1829081	91.8170919
R3.0137	R3.0	137	0.6518970	7.1699690	7.9253460	92.0746540
R3.0138	R3.0	138	0.6119650	6.5180720	7.6679810	92.3320190
R3.0139	R3.0	139	0.5731500	5.9061070	7.4106960	92.5893040
R3.0140	R3.0	140	0.5355110	5.3329570	7.1534120	92.8465880
R3.0141	R3.0	141	0.4990880	4.7974460	6.8960930	93.1039070
R3.0142	R3.0	142	0.4639030	4.2983580	6.6387510	93.3612490
R3.0143	R3.0	143	0.4299690	3.8344550	6.3814340	93.6185660
R3.0144	R3.0	144	0.3972850	3.4044860	6.1242290	93.8757710
R3.0145	R3.0	145	0.3658450	3.0072010	5.8672540	94.1327460
R3.0146	R3.0	146	0.3356360	2.6413560	5.6106530	94.3893470
R3.0147	R3.0	147	0.3066410	2.3057200	5.3545910	94.6454090
R3.0148	R3.0	148	0.2788620	1.9990790	5.0992460	94.9007540
R3.0149	R3.0	149	0.2522770	1.7202170	4.8448220	95.1551780
R3.0150	R3.0	150	0.2268850	1.4679400	4.5915160	95.4084840
R3.0151	R3.0	151	0.2026930	1.2410550	4.3395140	95.6604860
R3.0152	R3.0	152	0.1797100	1.0383620	4.0890000	95.9110000
R3.0153	R3.0	153	0.1579600	0.8586520	3.8401530	96.1598470
R3.0154	R3.0	154	0.1374690	0.7006920	3.5931400	96.4068600
R3.0155	R3.0	155	0.1182750	0.5632230	3.3480970	96.6519030
R3.0156	R3.0	156	0.1004170	0.4449480	3.1051630	96.8948370
R3.0157	R3.0	157	0.0839420	0.3445310	2.8644800	97.1355200
R3.0158	R3.0	158	0.0688930	0.2605890	2.6261500	97.3738500
R3.0159	R3.0	159	0.0553160	0.1916960	2.3902580	97.6097420
R3.0160	R3.0	160	0.0432485	0.1363800	2.1569580	97.8430420
R3.0161	R3.0	161	0.0327163	0.0931315	1.9263620	98.0736380
R3.0162	R3.0	162	0.0237359	0.0604152	1.6987790	98.3012210
R3.0163	R3.0	163	0.0163033	0.0366793	1.4745100	98.5254900
R3.0164	R3.0	164	0.0103913	0.0203760	1.2542690	98.7457310
R3.0165	R3.0	165	0.0059434	0.0099847	1.0392430	98.9607570
R3.0166	R3.0	166	0.0028646	0.0040413	0.8322900	99.1677100
R3.0167	R3.0	167	0.0010104	0.0011767	0.6413070	99.3586930
R3.0168	R3.0	168	0.0001662	0.0001662	0.4999820	99.5000180
R3.0169	R3.0	169	0.0000000	0.0000000	0.0000000	100.0000000

Iowa-type Retirement - Survival Tables

Percent Retired, Surviving, Condition, and Depreciation Reserve
as a function of Age as a Percent of Average Service Life

1	2	3	4	5	6	7
Lookup	Curve	Age %	% Ret	% Surv	% Cond	% Depr Resv
R4.0000	R4.0	0	0.0008278	100.0000000	100.0000000	0.0000000
R4.0001	R4.0	1	0.0009632	99.9991722	99.0013161	0.9986839
R4.0002	R4.0	2	0.0011139	99.9982090	98.0022631	1.9977369
R4.0003	R4.0	3	0.0012894	99.9970951	97.0033197	2.9966803
R4.0004	R4.0	4	0.0014858	99.9958057	96.0045939	3.9954061
R4.0005	R4.0	5	0.0017109	99.9943199	95.0060129	4.9939871
R4.0006	R4.0	6	0.0019645	99.9926090	94.0076304	5.9923696
R4.0007	R4.0	7	0.0022536	99.9906445	93.0094681	6.9905319
R4.0008	R4.0	8	0.0025768	99.9883909	92.0115519	7.9884481
R4.0009	R4.0	9	0.0029430	99.9858141	91.0139113	8.9860887
R4.0010	R4.0	10	0.0033541	99.9828711	90.0165749	9.9834251
R4.0011	R4.0	11	0.0038157	99.9795170	89.0195789	10.9804211
R4.0012	R4.0	12	0.0043325	99.9757013	88.0229569	11.9770431
R4.0013	R4.0	13	0.0049095	99.9713688	87.0267496	12.9732504
R4.0014	R4.0	14	0.0055561	99.9664593	86.0310001	13.9689999
R4.0015	R4.0	15	0.0062743	99.9609032	85.0357533	14.9642467
R4.0016	R4.0	16	0.0070753	99.9546289	84.0410605	15.9589395
R4.0017	R4.0	17	0.0079612	99.9475536	83.0469732	16.9530268
R4.0018	R4.0	18	0.0089484	99.9395924	82.0535498	17.9464502
R4.0019	R4.0	19	0.0100383	99.9306440	81.0608521	18.9391479
R4.0020	R4.0	20	0.0112429	99.9206057	80.0689449	19.9310551
R4.0021	R4.0	21	0.0125732	99.9093628	79.0778990	20.9221010
R4.0022	R4.0	22	0.0140372	99.8967896	78.0877886	21.9122114
R4.0023	R4.0	23	0.0156517	99.8827524	77.0986939	22.9013061
R4.0024	R4.0	24	0.0174217	99.8671007	76.1106977	23.8893023
R4.0025	R4.0	25	0.0193634	99.8496790	75.1238899	24.8761101
R4.0026	R4.0	26	0.0214911	99.8303156	74.1383648	25.8616352
R4.0027	R4.0	27	0.0238161	99.8088245	73.1542208	26.8457794
R4.0028	R4.0	28	0.0263576	99.7850084	72.1715622	27.8284378
R4.0029	R4.0	29	0.0291262	99.7586508	71.1904984	28.8095016
R4.0030	R4.0	30	0.0321426	99.7295246	70.2111445	29.7888555
R4.0031	R4.0	31	0.0354223	99.6973820	69.2336187	30.7663813
R4.0032	R4.0	32	0.0389815	99.6619597	68.2580481	31.7419519
R4.0033	R4.0	33	0.0428438	99.6229782	67.2845621	32.7154379
R4.0034	R4.0	34	0.0470247	99.5801344	66.3132954	33.6867046
R4.0035	R4.0	35	0.0515423	99.5331097	65.3443880	34.6556120
R4.0036	R4.0	36	0.0564251	99.4815674	64.3779860	35.6220140
R4.0037	R4.0	37	0.0616894	99.4251423	63.4142370	36.5857630
R4.0038	R4.0	38	0.0673580	99.3634529	62.4532971	37.5467029
R4.0039	R4.0	39	0.0734539	99.2960949	61.4953232	38.5046768
R4.0040	R4.0	40	0.0800018	99.2226410	60.5404782	39.4595218
R4.0041	R4.0	41	0.0870266	99.1426392	59.5889268	40.4110732
R4.0042	R4.0	42	0.0945492	99.0556126	58.6408401	41.3591599
R4.0043	R4.0	43	0.1025982	98.9610634	57.6963892	42.3036108
R4.0044	R4.0	44	0.1111975	98.8584652	56.7557492	43.2442508

Iowa-type Retirement - Survival Tables

Percent Retired, Surviving, Condition, and Depreciation Reserve
as a function of Age as a Percent of Average Service Life

1	2	3	4	5	6	7
Lookup	Curve	Age %	% Ret	% Surv	% Cond	% Depr Resv
R4.0045	R4.0	45	0.1203727	98.7472677	55.8190970	44.1809030
R4.0046	R4.0	46	0.1301480	98.6268950	54.8866129	45.1133871
R4.0047	R4.0	47	0.1405506	98.4967470	53.9584770	46.0415230
R4.0048	R4.0	48	0.1516085	98.3561964	53.0348692	46.9651308
R4.0049	R4.0	49	0.1633424	98.2045879	52.1159720	47.8840280
R4.0050	R4.0	50	0.1757803	98.0412455	51.2019682	48.7980318
R4.0051	R4.0	51	0.1889468	97.8654652	50.2930360	49.7069640
R4.0052	R4.0	52	0.2028656	97.6765184	49.3893561	50.6106439
R4.0053	R4.0	53	0.2175588	97.4736528	48.4911060	51.5088940
R4.0054	R4.0	54	0.2326536	97.2560940	47.5984602	52.4015398
R4.0055	R4.0	55	0.2497578	97.0234404	46.7115922	53.2884078
R4.0056	R4.0	56	0.2665119	96.7736826	45.8306670	54.1693330
R4.0057	R4.0	57	0.2845173	96.5071707	44.9558511	55.0441489
R4.0058	R4.0	58	0.3034000	96.2226534	44.0873008	55.9126992
R4.0059	R4.0	59	0.3231707	95.9192534	43.2251711	56.7748289
R4.0060	R4.0	60	0.3438416	95.5960827	42.3696070	57.6303930
R4.0061	R4.0	61	0.3654260	95.2522411	41.5207481	58.4792519
R4.0062	R4.0	62	0.3879290	94.8868151	40.6787262	59.3212738
R4.0063	R4.0	63	0.4113550	94.4988861	39.8436651	60.1563349
R4.0064	R4.0	64	0.4357090	94.0875311	39.0156770	60.9843230
R4.0065	R4.0	65	0.4609852	93.6518221	38.1948690	61.8051310
R4.0066	R4.0	66	0.4871807	93.1908369	37.3813329	62.6186671
R4.0067	R4.0	67	0.5142860	92.7036562	36.5751538	63.4248462
R4.0068	R4.0	68	0.5422850	92.1893702	35.7764020	64.2235980
R4.0069	R4.0	69	0.5711651	91.6470852	34.9851360	65.0148640
R4.0070	R4.0	70	0.6009006	91.0759201	34.2014031	65.7985969
R4.0071	R4.0	71	0.6314631	90.4750195	33.4252348	66.5747652
R4.0072	R4.0	72	0.6628237	89.8435564	32.6566491	67.3433509
R4.0073	R4.0	73	0.6949434	89.1807327	31.8956490	68.1043510
R4.0074	R4.0	74	0.7277765	88.4857893	31.1422219	68.8577781
R4.0075	R4.0	75	0.7612782	87.7580128	30.3963370	69.6036630
R4.0076	R4.0	76	0.7953930	86.9967346	29.6579499	70.3420501
R4.0077	R4.0	77	0.8300562	86.2013416	28.9269941	71.0730059
R4.0078	R4.0	78	0.8652038	85.3712854	28.2033880	71.7966120
R4.0079	R4.0	79	0.9007626	84.5060816	27.4870250	72.5129750
R4.0080	R4.0	80	0.9366550	83.6053190	26.7777820	73.2222180
R4.0081	R4.0	81	0.9727898	82.6686640	26.0755160	73.9244840
R4.0082	R4.0	82	1.0092020	81.6958742	25.3800550	74.6199450
R4.0083	R4.0	83	1.0464849	80.6866722	24.6912470	75.3087530
R4.0084	R4.0	84	1.0855894	79.6401873	24.0091240	75.9908760
R4.0085	R4.0	85	1.1274805	78.5545979	23.3340089	76.6659911
R4.0086	R4.0	86	1.1729546	77.4271174	22.6665139	77.3334861
R4.0087	R4.0	87	1.2225552	76.2541628	22.0074830	77.9925170
R4.0088	R4.0	88	1.2765531	75.0316076	21.3579230	78.6420770
R4.0089	R4.0	89	1.3349047	73.7550545	20.7189319	79.2810681

Iowa-type Retirement - Survival Tables

Percent Retired, Surviving, Condition, and Depreciation Reserve
as a function of Age as a Percent of Average Service Life

1	2	3	4	5	6	7
Lookup	Curve	Age %	% Ret	% Surv	% Cond	% Depr Resv
R4.0090	R4.0	90	1.3973417	72.4201498	20.0916240	79.9083760
R4.0091	R4.0	91	1.4632540	71.0228081	19.4770801	80.5229199
R4.0092	R4.0	92	1.5318708	69.5595541	18.8762820	81.1237180
R4.0093	R4.0	93	1.6022349	68.0276833	18.2900851	81.7099149
R4.0094	R4.0	94	1.6732702	66.4254484	17.7191961	82.2808039
R4.0095	R4.0	95	1.7437983	64.7521782	17.1641600	82.8358400
R4.0096	R4.0	96	1.8126111	63.0083799	16.6253510	83.3746490
R4.0097	R4.0	97	1.8785019	61.1957688	16.1029799	83.8970201
R4.0098	R4.0	98	1.9403057	59.3172669	15.5971090	84.4028910
R4.0099	R4.0	99	1.9969244	57.3769812	15.1076440	84.8923560
R4.0100	R4.0	100	2.0473556	55.3800368	14.6343750	85.3656250
R4.0101	R4.0	101	2.0907240	53.3326812	14.1769710	85.8230290
R4.0102	R4.0	102	2.1262794	51.2419572	13.7350060	86.2649940
R4.0103	R4.0	103	2.1534547	49.1156778	13.3079650	86.6920350
R4.0104	R4.0	104	2.1718040	46.9622231	12.8952750	87.1047250
R4.0105	R4.0	105	2.1810722	44.7904191	12.4962990	87.5037010
R4.0106	R4.0	106	2.1811419	42.6093469	12.1103610	87.8896390
R4.0107	R4.0	107	2.1720638	40.4282050	11.7367520	88.2632480
R4.0108	R4.0	108	2.1540241	38.2561412	11.3747400	88.6252600
R4.0109	R4.0	109	2.1273389	36.1021171	11.0235781	88.9764219
R4.0110	R4.0	110	2.0924511	33.9747782	10.6825140	89.3174860
R4.0111	R4.0	111	2.0498882	31.8823271	10.3507971	89.6492029
R4.0112	R4.0	112	2.0002858	29.8324389	10.0276790	89.9723210
R4.0113	R4.0	113	1.9443300	27.8321531	9.7124300	90.2875700
R4.0114	R4.0	114	1.8827472	25.8878231	9.4043380	90.5956620
R4.0115	R4.0	115	1.8162958	24.0050759	9.1027160	90.8972840
R4.0116	R4.0	116	1.7457612	22.1887801	8.8069040	91.1930960
R4.0117	R4.0	117	1.6718969	20.4430189	8.5162840	91.4837160
R4.0118	R4.0	118	1.5954540	18.7711220	8.2302750	91.7697250
R4.0119	R4.0	119	1.5171400	17.1756680	7.9483430	92.0516570
R4.0120	R4.0	120	1.4376240	15.6585280	7.6700060	92.3299940
R4.0121	R4.0	121	1.3575180	14.2209040	7.3948390	92.6051610
R4.0122	R4.0	122	1.2773730	12.8633860	7.1224760	92.8775240
R4.0123	R4.0	123	1.1976880	11.5860130	6.8526120	93.1473880
R4.0124	R4.0	124	1.1188790	10.3883250	6.5850130	93.4149870
R4.0125	R4.0	125	1.0413181	9.2694460	6.3195140	93.6804860
R4.0126	R4.0	126	0.9653040	8.2281280	6.0560060	93.9439940
R4.0127	R4.0	127	0.8910890	7.2628240	5.7944580	94.2055420
R4.0128	R4.0	128	0.8188760	6.3717350	5.5348880	94.4651120
R4.0129	R4.0	129	0.7488360	5.5528590	5.2773810	94.7226190
R4.0130	R4.0	130	0.6811100	4.8040230	5.0220640	94.9779360
R4.0131	R4.0	131	0.6158200	4.1229130	4.7691140	95.2308860
R4.0132	R4.0	132	0.5530780	3.5070930	4.5187400	95.4812600
R4.0133	R4.0	133	0.4930080	2.9540150	4.2715210	95.7284790
R4.0134	R4.0	134	0.4357350	2.4610070	4.0273490	95.9726510

Iowa-type Retirement - Survival Tables

Percent Retired, Surviving, Condition, and Depreciation Reserve
as a function of Age as a Percent of Average Service Life

1	2	3	4	5	6	7
Lookup	Curve	Age %	% Ret	% Surv	% Cond	% Depr Resv
R4.0135	R4.0	135	0.3814000	2.0252720	3.7864600	96.2135400
R4.0136	R4.0	136	0.3301680	1.6438720	3.5490210	96.4509790
R4.0137	R4.0	137	0.2822160	1.3137040	3.3315155	66.6848450
R4.0138	R4.0	138	0.2377380	1.0314880	3.0849780	96.9150220
R4.0139	R4.0	139	0.1969280	0.7937500	2.8585810	97.1414190
R4.0140	R4.0	140	0.1599700	0.5968220	2.6360510	97.3639490
R4.0141	R4.0	141	0.1270220	0.4368520	2.4174760	97.5825240
R4.0142	R4.0	142	0.0981870	0.3098300	2.2029340	97.7970660
R4.0143	R4.0	143	0.0734960	0.2116430	1.9925030	98.0074970
R4.0144	R4.0	144	0.0529003	0.1381470	1.7862840	98.2137160
R4.0145	R4.0	145	0.0362607	0.0852467	1.5844010	98.4155990
R4.0146	R4.0	146	0.0233463	0.0489860	1.3870900	98.6129100
R4.0147	R4.0	147	0.0138307	0.0256397	1.1948260	98.8051740
R4.0148	R4.0	148	0.0072948	0.0118090	1.0086400	98.9913600
R4.0149	R4.0	149	0.0032339	0.0045142	0.8306070	99.1693930
R4.0150	R4.0	150	0.0010741	0.0012803	0.6657290	99.3342710
R4.0151	R4.0	151	0.0002001	0.0002061	0.5292780	99.4707220
R4.0152	R4.0	152	0.0000060	0.0000060	0.5000830	99.4999170
R4.0153	R4.0	153	0.0000000	0.0000000	0.0000000	100.0000000

Iowa-type Retirement - Survival Tables

Percent Retired, Surviving, Condition, and Depreciation Reserve
as a function of Age as a Percent of Average Service Life

1	2	3	4	5	6	7
Lookup	Curve	Age %	% Ret	% Surv	% Cond	% Depr Resv
S3.0000	S3.0	0	0.0000000	100.0000000	100.0000000	0.0000000
S3.0001	S3.0	1	0.0000000	100.0000000	99.0000000	1.0000000
S3.0002	S3.0	2	0.0000000	100.0000000	98.0000000	2.0000000
S3.0003	S3.0	3	0.0000000	100.0000000	97.0000000	3.0000000
S3.0004	S3.0	4	0.0000000	100.0000000	96.0000000	4.0000000
S3.0005	S3.0	5	0.0000000	100.0000000	95.0000000	5.0000000
S3.0006	S3.0	6	0.0000009	100.0000000	94.0000000	6.0000000
S3.0007	S3.0	7	0.0000029	99.9999991	93.0000010	6.9999990
S3.0008	S3.0	8	0.0000057	99.9999962	92.0000038	7.9999962
S3.0009	S3.0	9	0.0000124	99.9999905	91.0000086	8.9999914
S3.0010	S3.0	10	0.0000229	99.9999781	90.0000200	9.9999800
S3.0011	S3.0	11	0.0000410	99.9999552	89.0000401	10.9999599
S3.0012	S3.0	12	0.0000706	99.9999142	88.0000773	11.9999227
S3.0013	S3.0	13	0.0001154	99.9998436	87.0001392	12.9998608
S3.0014	S3.0	14	0.0001821	99.9997282	86.0002394	13.9997606
S3.0015	S3.0	15	0.0002785	99.9995461	85.0003939	14.9996061
S3.0016	S3.0	16	0.0004120	99.9992676	84.0006294	15.9993706
S3.0017	S3.0	17	0.0005932	99.9988556	83.0009728	16.9990272
S3.0018	S3.0	18	0.0008402	99.9982624	82.0014629	17.9985371
S3.0019	S3.0	19	0.0011616	99.9974222	81.0021467	18.9978533
S3.0020	S3.0	20	0.0015783	99.9962606	80.0030832	19.9969168
S3.0021	S3.0	21	0.0021086	99.9946823	79.0043373	20.9956627
S3.0022	S3.0	22	0.0027761	99.9925737	78.0059929	21.9940071
S3.0023	S3.0	23	0.0036030	99.9897976	77.0081453	22.9918547
S3.0024	S3.0	24	0.0046177	99.9861946	76.0109024	23.9890976
S3.0025	S3.0	25	0.0058498	99.9815769	75.0143890	24.9856110
S3.0026	S3.0	26	0.0073300	99.9757271	74.0187492	25.9812508
S3.0027	S3.0	27	0.0090951	99.9683971	73.0241404	26.9758596
S3.0028	S3.0	28	0.0111771	99.9593020	72.0307388	27.9692612
S3.0029	S3.0	29	0.0136185	99.9481249	71.0387383	28.9612617
S3.0030	S3.0	30	0.0164585	99.9345064	70.0483513	29.9516487
S3.0031	S3.0	31	0.0197382	99.9180479	69.0598068	30.9401932
S3.0032	S3.0	32	0.0235014	99.8983097	68.0733528	31.9266472
S3.0033	S3.0	33	0.0277939	99.8748083	67.0892544	32.9107456
S3.0034	S3.0	34	0.0326624	99.8470144	66.1077900	33.8922100
S3.0035	S3.0	35	0.0381479	99.8143520	65.1292582	34.8707418
S3.0036	S3.0	36	0.0443048	99.7762041	64.1539688	35.8460312
S3.0037	S3.0	37	0.0511732	99.7318993	63.1822462	36.8177538
S3.0038	S3.0	38	0.0588046	99.6807261	62.2144260	37.7855740
S3.0039	S3.0	39	0.0672397	99.6219215	61.2508540	38.7491460
S3.0040	S3.0	40	0.0765267	99.5546818	60.2918859	39.7081141
S3.0041	S3.0	41	0.0867071	99.4781551	59.3378830	40.6621170
S3.0042	S3.0	42	0.0978231	99.3914480	58.3892121	41.6107879
S3.0043	S3.0	43	0.1099110	99.2936249	57.4462428	42.5537572
S3.0044	S3.0	44	0.1230097	99.1837139	56.5093489	43.4906511

Iowa-type Retirement - Survival Tables

Percent Retired, Surviving, Condition, and Depreciation Reserve
as a function of Age as a Percent of Average Service Life

1	2	3	4	5	6	7
Lookup	Curve	Age %	% Ret	% Surv	% Cond	% Depr Resv
S3.0045	S3.0	45	0.1371507	99.0607042	55.5788989	44.4211011
S3.0046	S3.0	46	0.1523667	98.9235535	54.6552620	45.3447380
S3.0047	S3.0	47	0.1686792	98.7711868	53.7388029	46.2611971
S3.0048	S3.0	48	0.1861134	98.6025076	52.8298788	47.1701212
S3.0049	S3.0	49	0.2046880	98.4163942	51.9288392	48.0711608
S3.0050	S3.0	50	0.2244149	98.2117062	51.0360251	48.9639749
S3.0051	S3.0	51	0.2453012	97.9872913	50.1517639	49.8482361
S3.0052	S3.0	52	0.2673512	97.7419901	49.2763739	50.7236261
S3.0053	S3.0	53	0.2905626	97.4746389	48.4101572	51.5898428
S3.0054	S3.0	54	0.3149290	97.1840763	47.5534000	52.4466000
S3.0055	S3.0	55	0.3404341	96.8691473	46.7063732	53.2936268
S3.0056	S3.0	56	0.3670616	96.5287132	45.8693328	54.1306672
S3.0057	S3.0	57	0.3947830	96.1616516	45.0425129	54.9574871
S3.0058	S3.0	58	0.4235687	95.7668686	44.2261319	55.7738681
S3.0059	S3.0	59	0.4533825	95.3432999	43.4203882	56.5796118
S3.0060	S3.0	60	0.4841824	94.8899174	42.6254621	57.3745379
S3.0061	S3.0	61	0.5159149	94.4057350	41.8415122	58.1584878
S3.0062	S3.0	62	0.5485287	93.8898201	41.0686789	58.9313211
S3.0063	S3.0	63	0.5819635	93.3412914	40.3070850	59.6929150
S3.0064	S3.0	64	0.6161499	92.7593279	39.5568309	60.4431691
S3.0065	S3.0	65	0.6510201	92.1431780	38.8179989	61.1820011
S3.0066	S3.0	66	0.6864967	91.4921579	38.0906539	61.9093461
S3.0067	S3.0	67	0.7224970	90.8056612	37.3748412	62.6251588
S3.0068	S3.0	68	0.7589350	90.0831642	36.6705899	63.3294101
S3.0069	S3.0	69	0.7957239	89.3242292	35.9779110	64.0220890
S3.0070	S3.0	70	0.8327675	88.5285053	35.2967982	64.7032018
S3.0071	S3.0	71	0.8699665	87.6957378	34.6272311	65.3727689
S3.0072	S3.0	72	0.9072227	86.8257713	33.9691749	66.0308251
S3.0073	S3.0	73	0.9444323	85.9185486	33.3225799	66.6774201
S3.0074	S3.0	74	0.9814892	84.9741163	32.6873822	67.3126178
S3.0075	S3.0	75	1.0182848	83.9926271	32.0635042	67.9364958
S3.0076	S3.0	76	1.0547151	82.9743423	31.4508619	68.5491381
S3.0077	S3.0	77	1.0906649	81.9196272	30.8493540	69.1506460
S3.0078	S3.0	78	1.1260299	80.8289623	30.2588730	69.7411270
S3.0079	S3.0	79	1.1606951	79.7029324	29.6793010	70.3206990
S3.0080	S3.0	80	1.1945553	78.5422373	29.1105120	70.8894880
S3.0081	S3.0	81	1.2275000	77.3476820	28.5523710	71.4476290
S3.0082	S3.0	82	1.2594261	76.1201820	28.0047390	71.9952610
S3.0083	S3.0	83	1.2902269	74.8607559	27.4674680	72.5325320
S3.0084	S3.0	84	1.3198013	73.5705290	26.9404030	73.0595970
S3.0085	S3.0	85	1.3480530	72.2507277	26.4233890	73.5766110
S3.0086	S3.0	86	1.3748846	70.9026747	25.9162619	74.0837381
S3.0087	S3.0	87	1.4002104	69.5277901	25.4188600	74.5811400
S3.0088	S3.0	88	1.4239378	68.1275797	24.9310110	75.0689890
S3.0089	S3.0	89	1.4459896	66.7036419	24.4525449	75.5474551

Iowa-type Retirement - Survival Tables

Percent Retired, Surviving, Condition, and Depreciation Reserve
as a function of Age as a Percent of Average Service Life

1	2	3	4	5	6	7
Lookup	Curve	Age %	% Ret	% Surv	% Cond	% Depr Resv
S3.0090	S3.0	90	1.4662924	65.2576523	23.9832900	76.0167100
S3.0091	S3.0	91	1.4847698	63.7913599	23.5230711	76.4769289
S3.0092	S3.0	92	1.5013619	62.3065901	23.0717111	76.9282889
S3.0093	S3.0	93	1.5160102	60.8052282	22.6290381	77.3709619
S3.0094	S3.0	94	1.5286632	59.2892180	22.1948710	77.8051290
S3.0095	S3.0	95	1.5392757	57.7605548	21.7690370	78.2309630
S3.0096	S3.0	96	1.5478119	56.2212791	21.3513601	78.6486399
S3.0097	S3.0	97	1.5542393	54.6734672	20.9416640	79.0583360
S3.0098	S3.0	98	1.5585370	53.1192279	20.5397761	79.4602239
S3.0099	S3.0	99	1.5606909	51.5606909	20.1455231	79.8544769
S3.0100	S3.0	100	1.5606909	50.0000000	19.7587349	80.2412651
S3.0101	S3.0	101	1.5585370	48.4393091	19.3792419	80.6207581
S3.0102	S3.0	102	1.5542393	46.8807721	19.0068769	80.9931231
S3.0103	S3.0	103	1.5478119	45.3265328	18.6414750	81.3585250
S3.0104	S3.0	104	1.5392757	43.7787209	18.2828729	81.7171271
S3.0105	S3.0	105	1.5286631	42.2394452	17.9309101	82.0690899
S3.0106	S3.0	106	1.5160103	40.7107821	17.5854299	82.4145701
S3.0107	S3.0	107	1.5013619	39.1947718	17.2462750	82.7537250
S3.0108	S3.0	108	1.4847698	37.6934099	16.9132950	83.0867050
S3.0109	S3.0	109	1.4662919	36.2086401	16.5863359	83.4136641
S3.0110	S3.0	110	1.4459901	34.7423482	16.2652550	83.7347450
S3.0111	S3.0	111	1.4239380	33.2963581	15.9499090	84.0500910
S3.0112	S3.0	112	1.4002102	31.8724201	15.6401500	84.3598500
S3.0113	S3.0	113	1.3748848	30.4722099	15.3358450	84.6641550
S3.0114	S3.0	114	1.3480530	29.0973251	15.0368600	84.9631400
S3.0115	S3.0	115	1.3198011	27.7492721	14.7430561	85.2569439
S3.0116	S3.0	116	1.2902269	26.4294710	14.4543080	85.5456920
S3.0117	S3.0	117	1.2594261	25.1392441	14.1704850	85.8295150
S3.0118	S3.0	118	1.2275000	23.8798180	13.8914710	86.1085290
S3.0119	S3.0	119	1.1945550	22.6523180	13.6171401	86.3828599
S3.0120	S3.0	120	1.1606951	21.4577630	13.3473700	86.6526300
S3.0121	S3.0	121	1.1260300	20.2970679	13.0820510	86.9179490
S3.0122	S3.0	122	1.0906648	19.1710379	12.8210681	87.1789319
S3.0123	S3.0	123	1.0547152	18.0803731	12.5643160	87.4356840
S3.0124	S3.0	124	1.0182848	17.0256579	12.3116800	87.6883200
S3.0125	S3.0	125	0.9814891	16.0073731	12.0630680	87.9369320
S3.0126	S3.0	126	0.9444329	15.0258840	11.8183630	88.1816370
S3.0127	S3.0	127	0.9072221	14.0814511	11.5774790	88.4225210
S3.0128	S3.0	128	0.8699670	13.1742290	11.3403140	88.6596860
S3.0129	S3.0	129	0.8327670	12.3042620	11.1067700	88.8932300
S3.0130	S3.0	130	0.7957240	11.4714950	10.8767610	89.1232390
S3.0131	S3.0	131	0.7589350	10.6757710	10.6501980	89.3498020
S3.0132	S3.0	132	0.7224970	9.9168360	10.4270001	89.5729999
S3.0133	S3.0	133	0.6864971	9.1943390	10.2070690	89.7929310
S3.0134	S3.0	134	0.6510199	8.5078420	9.9903250	90.0096750

Iowa-type Retirement - Survival Tables

Percent Retired, Surviving, Condition, and Depreciation Reserve
as a function of Age as a Percent of Average Service Life

1	2	3	4	5	6	7
Lookup	Curve	Age %	% Ret	% Surv	% Cond	% Depr Resv
S3.0135	S3.0	135	0.6161500	7.8568220	9.7766990	90.2233011
S3.0136	S3.0	136	0.5819630	7.2406720	9.5661089	90.4338911
S3.0137	S3.0	137	0.5485290	6.6587090	9.3584729	90.6415271
S3.0138	S3.0	138	0.5159150	6.1101800	9.1537210	90.8462790
S3.0139	S3.0	139	0.4841820	5.5942650	8.9517880	91.0482121
S3.0140	S3.0	140	0.4533830	5.1100830	8.7525981	91.2474020
S3.0141	S3.0	141	0.4235690	4.6567000	8.5560840	91.4439160
S3.0142	S3.0	142	0.3947830	4.2331310	8.3621800	91.6378200
S3.0143	S3.0	143	0.3670610	3.8383480	8.1708230	91.8291770
S3.0144	S3.0	144	0.3404340	3.4712870	7.9819520	92.0180480
S3.0145	S3.0	145	0.3149290	3.1308530	7.7955040	92.2044960
S3.0146	S3.0	146	0.2905630	2.8159240	7.6114220	92.3885780
S3.0147	S3.0	147	0.2673510	2.5253610	7.4296480	92.5703520
S3.0148	S3.0	148	0.2453010	2.2580100	7.2501270	92.7498730
S3.0149	S3.0	149	0.2244150	2.0127090	7.0728060	92.9271940
S3.0150	S3.0	150	0.2046880	1.7882940	6.8976320	93.1023680
S3.0151	S3.0	151	0.1861140	1.5836060	6.7245530	93.2754470
S3.0152	S3.0	152	0.1686790	1.3974920	6.5535220	93.4464780
S3.0153	S3.0	153	0.1523660	1.2288130	6.3844900	93.6155100
S3.0154	S3.0	154	0.1371510	1.0764470	6.2174110	93.7825890
S3.0155	S3.0	155	0.1230100	0.9392960	6.0522380	93.9477620
S3.0156	S3.0	156	0.1099110	0.8162860	5.8889290	94.1110710
S3.0157	S3.0	157	0.0978230	0.7063750	5.7274410	94.2725590
S3.0158	S3.0	158	0.0867070	0.6085520	5.5677320	94.4322680
S3.0159	S3.0	159	0.0765270	0.5218450	5.4097620	94.5902380
S3.0160	S3.0	160	0.0672400	0.4453180	5.2534920	94.7465080
S3.0161	S3.0	161	0.0588040	0.3780780	5.0988860	94.9011140
S3.0162	S3.0	162	0.0511730	0.3192740	4.9459060	95.0540940
S3.0163	S3.0	163	0.0443050	0.2681010	4.7945200	95.2054800
S3.0164	S3.0	164	0.0381480	0.2237960	4.6446910	95.3553090
S3.0165	S3.0	165	0.0326620	0.1856480	4.4963870	95.5036130
S3.0166	S3.0	166	0.0277940	0.1529860	4.3495800	95.6504200
S3.0167	S3.0	167	0.0235020	0.1251920	4.2042330	95.7957670
S3.0168	S3.0	168	0.0197375	0.1016900	4.0603190	95.9396810
S3.0169	S3.0	169	0.0164582	0.0819525	3.9178100	96.0821900
S3.0170	S3.0	170	0.0136189	0.0654943	3.7766790	96.2233210
S3.0171	S3.0	171	0.0111777	0.0518754	3.6369070	96.3630930
S3.0172	S3.0	172	0.0090944	0.0406977	3.4984640	96.5015360
S3.0173	S3.0	173	0.0073307	0.0316033	3.3613300	96.6386700
S3.0174	S3.0	174	0.0058498	0.0242726	3.2254840	96.7745160
S3.0175	S3.0	175	0.0046178	0.0184228	3.0909090	96.9090910
S3.0176	S3.0	176	0.0036030	0.0138050	2.9575850	97.0424150
S3.0177	S3.0	177	0.0027755	0.0102020	2.8255000	97.1745000
S3.0178	S3.0	178	0.0021089	0.0074265	2.6946400	97.3053600
S3.0179	S3.0	179	0.0015783	0.0053176	2.5649990	97.4350010

Iowa-type Retirement - Survival Tables

Percent Retired, Surviving, Condition, and Depreciation Reserve
as a function of Age as a Percent of Average Service Life

1	2	3	4	5	6	7
Lookup	Curve	Age %	% Ret	% Surv	% Cond	% Depr Resv
S3.0180	S3.0	180	0.0011617	0.0037393	2.4365660	97.5634340
S3.0181	S3.0	181	0.0008396	0.0025776	2.3093440	97.6906560
S3.0182	S3.0	182	0.0005946	0.0017381	2.1833410	97.8166590
S3.0183	S3.0	183	0.0004116	0.0011435	2.0585660	97.9414340
S3.0184	S3.0	184	0.0002778	0.0007319	1.9350420	98.0649580
S3.0185	S3.0	185	0.0001821	0.0004541	1.8128020	98.1871980
S3.0186	S3.0	186	0.0001156	0.0002720	1.6918880	98.3081120
S3.0187	S3.0	187	0.0000706	0.0001564	1.5723710	98.4276290
S3.0188	S3.0	188	0.0000413	0.0000858	1.4543500	98.5456500
S3.0189	S3.0	189	0.0000229	0.0000446	1.3379620	98.6620380
S3.0190	S3.0	190	0.0000119	0.0000217	1.2234140	98.7765860
S3.0191	S3.0	191	0.0000058	0.0000097	1.1110030	98.8889970
S3.0192	S3.0	192	0.0000025	0.0000040	1.0011880	98.9988120
S3.0193	S3.0	193	0.0000010	0.0000014	0.8946340	99.1053660
S3.0194	S3.0	194	0.0000003	0.0000004	0.7925260	99.2074740
S3.0195	S3.0	195	0.0000001	0.0000001	0.6968450	99.3031550
S3.0196	S3.0	196	0.0000000	0.0000000	0.6112800	99.3887200
S3.0197	S3.0	197	0.0000000	0.0000000	0.5431250	99.4568750
S3.0198	S3.0	198	0.0000000	0.0000000	0.5056800	99.4943200
S3.0199	S3.0	199	0.0000000	0.0000000	0.5000000	99.5000000
S3.0200	S3.0	200	0.0000000	0.0000000	0.0000000	100.0000000

**Township of East Norriton
Utility Valuation Experts' (UVE) Valuation of
East Norriton Wastewater Collection System
Montgomery County, Pennsylvania**

**Appraisal Work Papers
As of October 29, 2018**

Income Approach

**AUS Consultants
Suite 201
8555 West Forest Home Avenue
Greenfield, Wisconsin 53228
Office Telephone: 414-529-5755
J. Weinert's Cell: 414-698-8371
J. Weinert's E-Mail: weinertj@auswest.net**

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Income Approach

**Discounted Cash Flow Analysis
Investor-owned Rate Regulated Water Utility**

Periods 1 through 19 & 20 to perpetuity

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East Norriton Township Pennsylvania
 East Norriton Sanitary Sewer System
 Wastewater Collection and Treatment System
 Potential Purchaser: Investor-Owned Utility
 As of October 29, 2018
 Discounted Cash Flow Analysis

Discount Rate: Capitalization Rate	2.92%	6.31%											
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Period	Age	Revenues	O&M Expenses	Tax Depreciation	Cash Flow from Operations	Taxable Income Before State & Federal Taxes	State and Federal Taxes @ 28.89%	Capital Expenditures	Change in Working Capital	Net Cash Flows (3)-(4)-(8)-(9)-(10)	Period Present Worth Factor (PW)	PW of Cashflow (11)*(12)	Accumulated PW of Cashflows Sum (13)
1	0.5	3,397,875	2,472,398	851,685	925,477	73,792	21,318	325,506	415	578,238	0.963	556,843	556,843
2	1.5	3,482,822	2,546,780	863,065	936,042	72,977	21,083	330,588	424	583,947	0.892	520,881	1,077,724
3	2.5	4,092,316	2,624,599	874,835	1,467,717	592,882	171,284	335,756	3,047	957,630	0.827	791,960	1,869,684
4	3.5	4,194,624	2,705,974	887,005	1,488,650	601,645	173,815	341,015	512	973,308	0.766	745,554	2,615,238
5	4.5	4,299,490	2,791,030	899,584	1,508,460	608,876	175,904	346,357	525	985,674	0.710	699,829	3,315,067
6	5.5	4,910,018	2,884,460	912,585	2,025,558	1,112,973	321,538	351,793	3,052	1,349,175	0.658	887,757	4,202,824
7	6.5	5,018,038	2,981,657	925,757	2,036,381	1,110,624	320,859	356,351	540	1,358,631	0.609	827,406	5,030,230
8	7.5	5,128,435	3,082,768	939,603	2,045,667	1,106,064	319,542	361,965	552	1,363,608	0.565	770,439	5,800,669
9	8.5	5,254,104	3,187,947	953,905	2,566,157	1,612,252	465,780	367,677	3,128	1,729,572	0.523	904,566	6,705,235
10	9.5	5,880,694	3,297,354	968,671	2,583,340	1,614,669	466,478	373,484	634	1,742,744	0.485	845,231	7,550,466
11	10.5	6,010,068	3,411,155	983,914	2,598,914	1,615,000	466,574	379,390	646	1,752,304	0.449	786,784	8,337,250
12	11.5	6,502,895	3,529,576	999,645	2,973,369	1,973,724	570,209	385,394	2,465	2,015,301	0.416	838,365	9,175,615
13	12.5	6,645,959	3,652,643	1,014,485	2,993,315	1,978,831	571,684	391,503	715	2,029,414	0.386	783,354	9,958,969
14	13.5	6,792,170	3,780,697	1,031,224	3,011,473	1,980,249	572,094	397,713	730	2,040,336	0.357	728,614	10,687,583
15	14.5	7,349,128	3,913,880	1,048,492	3,435,248	2,386,756	689,534	404,031	2,786	2,338,857	0.331	774,175	11,461,758
16	15.5	7,349,128	4,060,649	1,009,636	3,288,479	2,278,843	658,358	321,918	-	2,308,203	0.307	708,618	12,170,376
17	16.5	7,349,128	4,213,126	1,022,508	3,136,002	2,113,494	610,588	325,573	-	2,199,941	0.284	624,755	12,795,131
18	17.5	7,790,076	4,371,535	1,035,679	3,418,541	2,382,862	688,409	329,273	2,205	2,398,654	0.263	630,846	13,425,977
19	18.5	7,790,076	4,536,109	1,049,154	3,253,967	2,204,813	636,970	333,017	-	2,283,980	0.244	557,291	13,983,268
20 and beyond	19.5	7,790,076	4,707,095	1,062,939	3,082,981	2,020,042	583,590	336,806	-	2,162,585	3.582	7,746,379	21,729,647
Age			68,751,382					7,095,110					
PW(Age) = 1/(1+Discount Rate) ^{Age}									19.5				
PW to Perpetuity = 1/Capitalization Rate									0.226				
									15.848				
PW _(Final Request) * PW to Perpetuity * PW Factor _(13.5)									3.582				

Deferred Tax

East Norriton Township Pennsylvania
East Norriton Sanitary Sewer System
Wastewater Collection and Treatment System
Potential Purchaser: Investor-Owned Utility
As of October 29, 2018
Calculated Rates of Return on Rate Base and Equity
(Years 1 through 20)

Period	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)		
Age																			
Revenue	(3)																		
Expenses	(4)																		
Book Depreciation	(5)																		
Ratemaking Interest Expense	(6)																		
Book Taxable Income (Current + Deferred)	(7)																		
State and Federal Taxes @ 28.89%	(8)																		
Net Operating Income	(9)																		
Net (Equity) Income	(10)																		
Net Plant	(11)																		
Working Capital	(12)																		
Accumulated Deferred Income Taxes (ADIT)	(13)																		
Rate Base	(14)																		
Return on Rate Base	(15)																		
Net Equity	(16)																		
Return on Equity	(17)																		
1	0.5	3,397,875	2,472,398	822,335	280,350	(3,144,151)(6)	(7) 728.88%	(7) 151,195	(7) 154,337	(126,013)	20,503,171	16,990	(8,480)	(111)(121)(13)	20,511,681	0.75%	14,364,987	(10)(16)	-0.88%
2	1.5	3,482,822	2,546,780	803,553	271,005	(138,516)	(40,017)	(40,017)	172,506	(98,499)	20,030,206	17,414	(25,673)	20,021,947	0.86%	14,062,488	-0.70%		
3	2.5	4,092,316	2,624,599	781,489	261,972	424,256	122,568	122,568	563,660	301,688	19,584,473	20,461	(52,641)	19,552,293	2.88%	14,167,943	2.13%		
4	3.5	4,164,624	2,705,974	756,079	253,239	479,333	138,479	138,479	594,092	340,853	19,169,409	20,973	(90,465)	19,099,917	3.11%	14,415,104	2.88%		
5	4.5	4,299,490	2,791,030	735,949	244,798	577,713	152,456	152,456	620,035	375,257	18,779,817	21,498	(137,339)	18,663,376	3.42%	14,510,992	2.99%		
6	5.5	4,910,018	2,884,460	712,780	236,638	1,076,140	310,897	310,897	1,001,881	765,243	18,418,830	24,550	(195,463)	18,247,917	5.49%	15,098,978	5.07%		
7	6.5	5,018,038	2,981,657	695,964	228,750	1,111,667	321,161	321,161	1,019,256	790,506	18,079,213	25,090	(261,851)	17,842,452	5.71%	15,718,136	5.02%		
8	7.5	5,128,435	3,082,768	669,465	213,125	1,155,077	333,702	333,702	1,042,500	821,375	17,771,709	25,642	(339,894)	17,457,457	5.97%	16,373,874	5.97%		
9	8.5	5,254,104	3,187,947	645,269	213,754	1,207,134	403,191	403,191	1,437,697	1,213,943	17,494,113	28,770	(429,059)	17,093,824	8.35%	17,427,702	6.97%		
10	9.5	5,880,694	3,297,354	625,939	206,628	1,750,782	505,401	505,401	1,451,610	1,244,981	17,241,665	29,404	(538,077)	16,743,992	8.67%	18,517,906	6.77%		
11	10.5	6,010,069	3,411,155	603,479	195,741	1,795,694	518,776	518,776	1,476,659	1,276,918	17,017,172	30,050	(637,985)	16,409,637	9.00%	19,645,205	6.50%		
12	11.5	6,502,895	3,529,526	581,610	193,083	2,198,676	635,107	635,107	1,756,562	1,563,479	16,821,352	32,515	(758,755)	16,095,112	10.91%	21,064,052	7.42%		
13	12.5	6,645,959	3,652,643	562,484	186,647	2,744,185	648,345	648,345	1,782,487	1,595,440	16,650,367	33,230	(889,338)	15,794,259	11.29%	22,520,081	7.09%		
14	13.5	6,792,170	3,780,697	542,312	180,426	2,298,735	661,215	661,215	1,807,946	1,627,520	16,505,763	33,960	(1,030,584)	15,509,139	11.66%	24,012,450	6.78%		
15	14.5	7,449,128	3,913,880	521,207	174,411	2,739,630	793,479	793,479	1,122,562	1,948,151	16,388,583	36,746	(1,182,917)	15,242,412	13.93%	25,824,956	7.54%		
16	15.5	7,449,128	4,060,649	506,152	168,588	2,613,729	755,106	755,106	1,027,221	1,858,023	16,204,346	36,746	(1,328,373)	14,912,719	13.59%	27,562,290	6.74%		
17	16.5	7,449,128	4,213,126	489,424	162,978	2,483,600	717,512	717,512	929,066	1,766,088	16,040,491	36,746	(1,482,381)	14,594,856	13.22%	29,206,297	6.05%		
18	17.5	7,790,076	4,371,535	476,751	157,545	2,794,245	804,369	804,369	1,137,421	1,979,876	15,893,009	38,951	(1,643,856)	14,288,104	14.96%	31,068,162	6.37%		
19	18.5	7,790,076	4,536,109	464,633	152,294	2,636,980	763,824	763,824	1,027,450	1,875,156	15,761,319	38,951	(1,812,707)	13,987,573	14.49%	32,829,240	5.71%		
20	19.5	7,790,076	4,707,045	449,514	147,171	2,486,594	718,118	718,118	1,915,269	1,768,972	15,648,757	38,951	(1,989,366)	13,697,742	13.98%	34,487,037	5.18%		

3,536,613.19

**Water and Wastewater Cost of Capital
Third Quarter 2018 (10-1-2018)**

As a Investor-Owned Utility

Weighted Cost of Capital (Discount Rate)
(1)

(1)	(2)	(2a)	(3)	(3a)	(4)	(4a)	(5)
	Portion of Capital AUS Input	Type of Data	Capital Cost AUS Input	Type of Data	Tax Rate	Tax affect on cost of capital	After-tax Market Capital Cost (2)*(3)*(4a)
Debt	30%	Market	4.45%	Market	28.89%	71.11%	0.95%
Equity	70%	Market	9.95%	Market	0.0%	100.0%	6.97%
Total Capital r	100.0%						7.92%
Growth (g)							1.52%
Rate without Growth: $\frac{r}{1+g}$-1							6.31%

Weighted Cost of Capital (Capitlization Rate)
(1)

(1)	(2)	(2a)	(3)	(3a)	(4)	(4a)	(5)
	Portion of Capital AUS Input	Type of Data	Capital Cost AUS Input	Type of Data	Tax Rate	Tax affect on cost of capital	Market Capital Cost (2)*(3)
Debt	30%	Market	4.45%	Market	Not Applicable	Not Applicable	1.34%
Equity	70%	Market	9.95%	Market	Not Applicable	Not Applicable	6.97%
Total Capital r	100.0%						8.31%
Growth (g)							1.52%
Rate without Growth: $\frac{r}{1+g}$-1							6.69%

Weighted Cost of Capital (Rate of Return on Rate Base)
(1)

(1)	(2)	(2a)	(3)	(3a)	(4)	(4a)	(5)
	Portion of Capital AUS Input	Type of Data	Capital Cost AUS Input	Type of Data	Tax Rate	Tax affect on cost of capital	Required Return on Rate Base (2)*(3)
Debt	45%	Embedded	4.99%	Embedded	Not Applicable	Not Applicable	2.25%
Equity	55%	Embedded	9.95%	Market	Not Applicable	Not Applicable	5.47%
Total Capital r	100.0%						7.72%
Growth (g)						Not Applicable	0.00%
Rate without Growth: $\frac{r}{1+g}$-1							7.72%

**Township of East Norriton
Utility Valuation Experts' (UVE) Valuation of
East Norriton Wastewater Collection System
Montgomery County, Pennsylvania**

**Appraisal Work Papers
As of October 29, 2018**

**Income Approach
Income Forecast
Investor-owned Rate Regulated Water Utility
Periods 1 through 19 & 20 to perpetuity**

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Income Approach

	0	1	2	3	4	5	6	7	8	9
Income Statement										
Revenues										
Annual Revenue Growth rate		0.0%	0.0%	2.5%	0.0%	2.5%	1.5%	2.2%	2.2%	2.2%
Subscriber Growth Rate (Annually)										
Periodic Subscriber Growth		0.0%	0.0%	2.5%	0.0%	2.5%	1.5%	2.2%	2.2%	2.2%
Rate Class Activities										
Periodic Rate Class (years)		1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Required Rate Increase		4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%
Proposed Rate Increase		75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000
Total Revenue Adjustments		265,999	265,999	265,999	265,999	265,999	265,999	265,999	265,999	265,999
Base and Forecast		3,197,875	3,482,822	4,067,110	4,196,624	4,299,490	4,610,018	5,015,038	5,128,435	5,774,104
Operating Expenses										
Administration		187,787	191,962	193,478	195,413	197,367	199,341	201,334	203,347	205,380
Contracted services		1,872,446	2,025,218	2,106,248	2,190,498	2,278,118	2,369,243	2,464,013	2,562,574	2,665,077
Repairs and maintenance		75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000
Salaries and wages		265,999	265,999	265,999	265,999	265,999	265,999	265,999	265,999	265,999
Utilities and energy		31,000,000	31,374,697	31,848,036	32,316,411	32,780,135	33,239,423	33,694,464	34,145,867	34,593,081
Property Taxes		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Begin Plant		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Book Depreciation (based on Beginning Year Property Plant & Equipment)		822,335	803,553	791,489	776,079	757,949	732,280	698,964	659,485	615,316
Total Operating Expenses		3,294,233	3,363,333	3,408,988	3,462,053	3,526,979	3,602,713	3,679,621	3,757,911	3,837,316
Cost of Operation as % of Revenues (Calculation)		97.0%	96.2%	84.2%	82.5%	82.0%	71.3%	71.3%	71.3%	66.1%
Operating Expense less Depreciation		2,472,398	2,540,780	2,614,399	2,705,974	2,791,030	2,868,400	2,984,657	3,082,768	3,197,047
Operating Income		103,142	132,486	660,228	732,571	772,511	1,112,178	1,340,417	1,376,202	1,930,088
Nonoperating Revenues (Expenses)										
Interest Income		280,350	271,005	261,972	253,239	244,798	236,538	228,750	221,115	213,754
Interest Exp as % of Debt		4.45%	4.45%	4.45%	4.45%	4.45%	4.45%	4.45%	4.45%	4.45%
Total nonoperating revenues (expenses)		280,350.00	271,005.00	261,972.00	253,239.00	244,798.00	236,538.00	228,750.00	221,115.00	213,754.00
Income (loss) before State and Federal Taxes		(177,208)	(138,516)	44,256	479,332	527,713	1,076,140	1,111,667	1,155,077	1,707,334
State and Federal Taxes		(51,195)	(40,017)	12,568	138,479	152,456	310,897	321,161	333,702	403,191
State and Federal Tax Rate		28.89%	28.89%	28.89%	28.89%	28.89%	28.89%	28.89%	28.89%	28.89%
Income After Taxes		(126,013)	(98,499)	56,688	340,853	375,257	765,243	790,506	821,375	1,213,943
Income After Taxes plus interest		154,337	172,506	563,660	554,092	620,055	1,001,981	1,030,256	1,042,580	1,427,697
Earnings before Interest, Taxes, Depreciation & Amortization		935,977	936,042	1,467,717	1,488,650	1,508,460	2,025,358	2,036,381	2,045,667	2,506,157
Income (loss) before State and Federal Taxes		(177,208)	(138,516)	44,256	479,332	527,713	1,076,140	1,111,667	1,155,077	1,707,334
Book Depreciation		822,335	803,553	791,489	776,079	757,949	732,280	698,964	659,485	615,316
Tax Depreciation		(951,085)	(900,000)	(840,000)	(770,000)	(680,000)	(550,000)	(350,000)	(150,000)	(50,000)
Income Adjusted for Tax Depreciation		(29,958)	(336,964)	(395,744)	(293,921)	(252,251)	(273,840)	(241,333)	(205,323)	(257,666)
Income Tax Rate		28.89%	28.89%	28.89%	28.89%	28.89%	28.89%	28.89%	28.89%	28.89%
Income Taxes		(8,747)	(9,697)	(11,344)	(8,460)	(7,280)	(7,804)	(7,770)	(7,732)	(7,447)
Income After Tax		(38,705)	(48,161)	(47,408)	(378,381)	(259,531)	(281,644)	(249,103)	(213,053)	(265,113)
Deferred Income Taxes		(8,480)	(17,193)	(37,844)	(67,244)	(87,274)	(117,244)	(146,883)	(178,444)	(209,472)
Accumulated Deferred Income Taxes		(8,480)	(25,673)	(63,517)	(130,761)	(218,035)	(335,279)	(482,162)	(650,606)	(849,078)
Income After Taxes (Book Depreciation)		(47,185)	(65,354)	(85,252)	(445,641)	(346,811)	(408,888)	(465,976)	(528,079)	(614,591)
Plus Interest		280,350	271,005	261,972	253,239	244,798	236,538	228,750	221,115	213,754

East Norriton Township Pennsylvania
 East Norriton Sanitary Sewer System
 Wastewater Collection and Treatment System
 Potential Purchaser: Investor-Owned Utility
 As of October 28, 2018

	0	1	2	3	4	5	6	7	8	9
Other Tax Income, Debt Free		162,812	180,898	199,028	631,516	867,379	1,099,605	1,086,644	1,120,543	1,116,862
		2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%
Balance Statement										
Assets										
Current Assets		67,968	69,656	81,246	82,892	85,990	98,120	100,361	102,600	115,082
Current Asset Balance		215,506.00	330,986.00	335,756.00	344,035.00	346,357.00	351,793.00	356,151.00	361,965.60	367,677.00
Cl. as % of Revenues		2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%
Balance Statement										
Property Plant & Equipment										
Total PP&E		21,000,000.00	21,274,907.05	21,554,227.05	21,838,433.05	22,126,433.05	22,419,429.05	22,717,168.05	23,019,061.05	23,325,831.05
Begin Balance										
Additions										
Retirements		(90,599.00)	(51,266.00)	(51,987.00)	(52,638.00)	(53,341.00)	(54,054.00)	(54,788.00)	(55,543.00)	(56,328.00)
End Balance		21,274,907.05	21,554,227.05	21,838,433.05	22,126,433.05	22,419,429.05	22,717,168.05	23,019,061.05	23,325,831.05	23,637,568.05
Book Depreciation of Property Plant & Equipment		31,274,907.05	21,554,227.05	21,838,433.05	22,126,433.05	22,419,429.05	22,717,168.05	23,019,061.05	23,325,831.05	23,637,568.05
Total Book Depreciation		(8,274,907.05)	(8,000,300.00)	(7,783,800.00)	(7,588,000.00)	(7,392,000.00)	(7,205,000.00)	(7,027,000.00)	(6,858,000.00)	(6,697,000.00)
Begin Balance										
Depreciation		(8,274,907.05)	(8,000,300.00)	(7,783,800.00)	(7,588,000.00)	(7,392,000.00)	(7,205,000.00)	(7,027,000.00)	(6,858,000.00)	(6,697,000.00)
Retirements		50,599.00	51,266.00	51,987.00	52,638.00	53,341.00	54,054.00	54,788.00	55,543.00	56,328.00
End Balance		(7,719,207.05)	(7,499,034.00)	(7,266,613.00)	(7,030,362.00)	(6,788,659.00)	(6,542,954.00)	(6,293,206.00)	(6,039,457.00)	(5,781,672.00)
End Balance Check										
Net Plant		21,000,000.00	20,501,170.84	20,030,206.29	19,584,473.40	19,169,409.25	18,779,817.11	18,418,829.69	18,079,212.77	17,771,709.10
Begin Balance		20,501,170.84	20,030,206.29	19,584,473.40	19,169,409.25	18,779,817.11	18,418,829.69	18,079,212.77	17,771,709.10	17,484,113.38
End Balance		20,571,128.83	20,695,862.29	20,866,319.40	21,053,301.25	21,265,867.11	21,517,629.69	21,819,573.77	22,184,276.10	22,619,195.38
Total Assets		(851,085.44)	(863,065.23)	(874,834.90)	(887,004.96)	(899,584.09)	(912,684.88)	(926,316.19)	(940,503.38)	(955,304.70)
Tax Depreciation of Property Plant & Equipment										
Total MACRS Depreciation		50,599.00	51,266.00	51,987.00	52,638.00	53,341.00	54,054.00	54,788.00	55,543.00	56,328.00
Begin Balance		(801,086.44)	(811,792.23)	(822,805.90)	(834,166.96)	(846,241.09)	(859,039.88)	(872,584.84)	(886,941.38)	(902,169.70)
Depreciation		(801,086.44)	(811,792.23)	(822,805.90)	(834,166.96)	(846,241.09)	(859,039.88)	(872,584.84)	(886,941.38)	(902,169.70)
Retirements										
End Balance		21,000,000.00	21,274,907.05	21,554,227.05	21,838,433.05	22,126,433.05	22,419,429.05	22,717,168.05	23,019,061.05	23,325,831.05
End Balance Check		20,473,830.61	20,742,429.80	21,015,148.15	21,292,046.09	21,573,185.96	21,858,613.17	22,147,762.71	22,441,422.67	22,739,605.35
Net Plant		(851,085.44)	(863,065.23)	(874,834.90)	(887,004.96)	(899,584.09)	(912,684.88)	(926,316.19)	(940,503.38)	(955,304.70)
Total MACRS Depreciation		50,599.00	51,266.00	51,987.00	52,638.00	53,341.00	54,054.00	54,788.00	55,543.00	56,328.00
Begin Balance		(801,086.44)	(811,792.23)	(822,805.90)	(834,166.96)	(846,241.09)	(859,039.88)	(872,584.84)	(886,941.38)	(902,169.70)
Depreciation		(801,086.44)	(811,792.23)	(822,805.90)	(834,166.96)	(846,241.09)	(859,039.88)	(872,584.84)	(886,941.38)	(902,169.70)
Retirements										
End Balance		21,000,000.00	21,274,907.05	21,554,227.05	21,838,433.05	22,126,433.05	22,419,429.05	22,717,168.05	23,019,061.05	23,325,831.05
End Balance Check		20,473,830.61	20,742,429.80	21,015,148.15	21,292,046.09	21,573,185.96	21,858,613.17	22,147,762.71	22,441,422.67	22,739,605.35
Net Plant		(851,085.44)	(863,065.23)	(874,834.90)	(887,004.96)	(899,584.09)	(912,684.88)	(926,316.19)	(940,503.38)	(955,304.70)
Total MACRS Depreciation		(822,335.21)	(803,552.54)	(781,488.89)	(756,079.15)	(732,949.14)	(712,780.42)	(695,963.92)	(680,444.67)	(665,268.72)
Begin Balance		(29,190.21)	(59,512.71)	(93,146.01)	(130,925.81)	(163,634.95)	(199,804.46)	(239,792.91)	(279,138.71)	(318,635.98)
Depreciation		(29,190.21)	(59,512.71)	(93,146.01)	(130,925.81)	(163,634.95)	(199,804.46)	(239,792.91)	(279,138.71)	(318,635.98)
Retirements										
End Balance		50,968	52,242	61,855	62,919	64,492	73,650	75,271	76,927	86,312
End Balance Check		1.50%	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%
Cl. as % of Revenues		1.50%	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%

DGF Investor Owned

East Norriton Township Pennsylvania
 East Norriton Sanitary Sewer System
 Wastewater Collection and Treatment System
 Potential Purchaser: Investor-Owned Utility
 As of October 29, 2018

	16 & beyond	1	2	3	4	5	6	7	8	9
Financment Liabilities										
Long Term Debt, Notes payable, net of current portion		6,300,000.05	6,090,000.05	5,887,000.05	5,690,767.05	5,501,075.05	5,317,706.05	5,140,448.05	4,965,101.05	4,803,464.05
Additional Debt										
Debt Repayment		(210,000)	(203,000)	(196,233)	(189,692)	(183,169)	(177,257)	(171,348)	(165,637)	(160,115)
Debt Repayment years		30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00
End Long Term Debt, Notes payable, net of current portion		6,090,000.05	5,887,000.05	5,690,767.05	5,501,075.05	5,317,706.05	5,140,448.05	4,965,101.05	4,803,464.05	4,643,349.05
Total noncurrent liabilities										
Deferred Tax Liabilities										
Begin Balance		8,480	8,480	25,673	52,641	90,465	137,739	195,461	261,851	330,804
Additions to Deferred Asset										
Total Deferred Tax Liability		8,480	8,480	25,673	52,641	90,465	137,739	195,461	261,851	330,804
Total Liabilities		6,140,448.05	5,964,315.05	5,804,791.05	5,654,459.05	5,510,931.05	5,409,592.05	5,306,223.05	5,220,285.05	5,158,720.05
Equity										
Proportion of Capital	70%									
Beginning Equity Capital		14,700,000	14,363,987	14,062,488	14,167,943	14,319,104	14,510,992	15,098,978	15,718,136	16,374,674
Additions to Equity (Retained Earnings)		(336,013)	(301,899)	(269,455)	(237,161)	(204,888)	(172,511)	(140,417)	(108,828)	(77,128)
Deductions from Equity	0	0	0	0	0	0	0	0	0	0
Ending Equity Capital		14,363,987	14,062,488	14,167,943	14,319,104	14,510,992	15,098,978	15,718,136	16,374,674	17,027,702
Operating Income		103,142	132,489	168,228	212,571	260,888	318,778	389,417	476,202	581,888
Return On Equity		0.72%	0.94%	1.22%	1.61%	2.12%	2.82%	3.72%	4.82%	6.12%
Total Liabilities & Stockholders Equity		20,514,435	20,027,401	19,972,736	19,972,736	20,030,929	20,508,540	21,024,359	21,594,159	22,586,422
Assets less Liabilities & Stockholders Equity		57,654	72,459	(806,417)	(720,262)	(1,165,122)	(1,991,510)	(2,844,785)	(3,719,883)	(4,677,227)
Capital Expenditures and Changes in Working Capital										
Capital Expenditures		325,506.00	330,588.00	335,756.00	341,015.00	346,357.00	351,793.00	356,351.00	361,065.00	367,077.00
Changes in Working Capital										
Current Assets	66,300	67,958	69,656	81,846	83,892	85,990	88,200	100,361	102,565	115,082
Current Liabilities	49,725	50,968	52,243	61,385	62,919	64,402	71,650	76,271	76,937	86,117
Working Capital	16,575	16,990	17,414	20,461	20,973	21,488	24,550	25,090	25,642	28,770
Changes in Working Capital		415	424	3,047	512	525	1,052	540	552	3,128
CASH FLOW										
Income from Operations		154,337	172,506	563,660	594,092	630,055	1,001,881	1,019,236	1,042,500	1,427,607
Non Cash Expenses (depreciation)		822,335	803,553	781,489	756,079	735,849	712,780	695,964	669,465	645,269
Capital Expenditures		325,506	330,588	335,756	341,015	346,357	351,793	356,351	361,065	367,077
Change in Working Capital		415	424	3,047	512	525	1,052	540	552	3,128
Net Cash Flow		950,751	645,047	1,006,346	1,008,644	1,009,122	1,359,816	1,358,329	1,349,448	1,702,161
Period	0.5	1.5	2.5	3.5	4.5	5.5	6.5	7.5	8.5	
PW Factor		8.31%	8.31%	8.31%	8.31%	8.31%	8.31%	8.31%	8.31%	8.31%
Discount Rate with growth		6.69%	6.69%	6.69%	6.69%	6.69%	6.69%	6.69%	6.69%	6.69%
Period Present Worth Factor (PW)		0.961	0.887	0.819	0.756	0.698	0.646	0.595	0.55	0.507
PW of Cashflow		625,372	572,157	824,197	762,515	704,367	877,081	808,206	742,306	862,986
Accumulated PW of Cashflows		625,372	1,197,529	2,021,726	2,784,201	3,488,628	4,165,709	5,174,915	5,916,111	6,779,107
CASH FLOW										
Income from Operations		(146,883)	(140,818)	(140,818)	(140,818)	(140,818)	(140,818)	(140,818)	(140,818)	(140,818)
Depreciation		(851,685)	(863,065)	(874,815)	(887,005)	(899,584)	(912,485)	(925,757)	(939,603)	(953,005)
Capital Expenditures		325,506	330,588	335,756	341,015	346,357	351,793	356,351	361,065	367,077
Change in Working Capital		415	424	3,047	512	525	1,052	540	552	3,128
Net Cash Flow		378,581	393,235	771,347	793,229	811,598	1,180,902	1,195,967	1,206,366	1,577,522
Period	0.5	1.5	2.5	3.5	4.5	5.5	6.5	7.5	8.5	
PW Factor		8.31%	8.31%	8.31%	8.31%	8.31%	8.31%	8.31%	8.31%	8.31%
Discount Rate without growth		6.69%	6.69%	6.69%	6.69%	6.69%	6.69%	6.69%	6.69%	6.69%

East Norriton Township Pennsylvania
 East Norriton Sanitary Sewer System
 Wastewater Collection and Treatment System
 Potential Purchaser: Investor-Owned Utility
 As of October 29, 2016

	Base	1.5	16 & beyond	1	2	3	4	5	6	7	8	9
Discount Rate with growth	8.31%	8.31%	8.31%	8.31%	8.31%	8.31%	8.31%	8.31%	8.31%	8.31%	8.31%	8.31%
Discount Rate without growth	6.69%	6.69%	6.69%	6.69%	6.69%	6.69%	6.69%	6.69%	6.69%	6.69%	6.69%	6.69%
Period Present Worth Factor (PW)		0.961	0.887	0.819	0.756	0.698	0.645	0.595	0.55	0.51	0.47	0.43
PW of Cashflow		384,105	347,025	631,729	598,681	566,495	534,309	502,123	470,937	440,751	411,565	383,379
Accumulated PW of Cashflows	18,427,730	364,105	1,342,859	1,947,540	2,509,035	3,270,717	3,982,317	4,645,818	5,260,319	5,826,820	6,344,321	6,811,822
Rate Case Forecasts												
Rate Base		21,274,907.05	21,554,227.05	21,838,036.05	22,126,413.05	22,419,429.05	22,717,168.05	23,019,061.05	23,325,833.05	23,637,588.05	23,949,343.05	24,261,098.05
Plant in Service		(771,736.22)	(1,524,020.76)	(2,253,562.65)	(2,957,003.80)	(3,639,611.94)	(4,298,338.36)	(4,935,848.28)	(5,554,123.95)	(6,143,854.67)	(6,704,541.39)	(7,236,770.00)
Accumulated Book Depreciation		16,990.00	17,414.00	20,461.00	20,973.00	21,498.00	22,020.00	22,542.00	23,064.00	23,586.00	24,108.00	24,630.00
Working Capital		(8,480)	(25,673)	(52,866)	(80,059)	(107,252)	(134,445)	(161,638)	(188,831)	(216,024)	(243,217)	(270,410)
Accumulated Deferred Income Tax		30,311,680.81	20,021,947.29	19,552,293.40	19,099,917.25	18,663,576.11	18,247,916.69	17,847,451.77	17,457,457.10	17,093,824.38	16,754,004.00	16,428,183.62
Rate Base		3,397,875.00	3,482,822.00	4,092,316.00	4,194,624.00	4,299,490.00	4,401,018.00	4,508,036.00	4,620,344.00	4,737,452.00	4,861,860.00	4,993,070.00
Revenues		2,472,398.00	2,546,780.00	2,624,599.00	2,705,974.00	2,791,030.00	2,884,460.00	2,981,657.00	3,082,768.00	3,187,947.00	3,297,347.00	3,411,147.00
O&M Expenses		822,335.22	803,552.54	781,488.89	756,079.15	735,949.14	712,780.42	695,963.92	684,464.07	678,287.00	676,427.00	678,972.00
Book Depreciation		280,350.00	271,005.00	261,972.00	253,239.00	244,798.00	236,638.00	228,750.00	221,125.00	213,754.00	206,229.00	198,554.00
Ratemaking Interest Expense		(177,208.22)	(138,515.54)	424,256.11	479,331.85	527,715.86	576,100.00	624,484.00	672,868.00	721,252.00	769,636.00	818,020.00
Book Income (Current-Deferred)		151,195.00	(40,017.00)	122,568.00	138,479.00	152,495.00	170,897.00	191,161.00	211,425.00	231,689.00	251,953.00	272,217.00
State & Federal Taxes @ 26.80%		154,336.78	172,506.46	190,686.11	208,865.78	227,045.45	245,225.12	263,404.79	281,584.46	300,764.13	319,943.80	339,123.47
Net Operating Income		154,337	172,506	190,686	208,866	227,045	245,225	263,405	281,584	300,764	319,944	339,123
Income from Operations		154,337	172,506	190,686	208,866	227,045	245,225	263,405	281,584	300,764	319,944	339,123
Return on Rate Base		0.72%	0.86%	0.88%	0.94%	0.98%	1.04%	1.08%	1.14%	1.20%	1.26%	1.32%
Required Return	7.72%	7.72%	7.72%	7.72%	7.72%	7.72%	7.72%	7.72%	7.72%	7.72%	7.72%	7.72%
Authorized Return		1,583,502	1,545,694	1,509,437	1,474,514	1,440,828	1,408,739	1,377,437	1,347,716	1,319,643	1,293,170	1,267,287
After-tax Net Income		(126,013)	(98,499)	(80,168)	(64,853)	(52,257)	(42,843)	(35,243)	(29,161)	(24,137)	(19,963)	(16,493)
Taxes		(51,195)	(40,017)	(32,568)	(26,479)	(21,456)	(17,140)	(13,516)	(10,516)	(8,216)	(6,516)	(5,116)
Pre-tax Net Income		(177,208)	(138,516)	(112,736)	(91,332)	(73,713)	(59,983)	(48,727)	(39,677)	(32,382)	(26,479)	(21,608)
Interest Expense		(280,350)	(271,005)	(261,972)	(253,239)	(244,798)	(236,638)	(228,750)	(221,125)	(213,754)	(206,229)	(198,554)
Operating Income		101,142	132,489	148,228	158,106	167,235	175,767	183,681	191,061	197,939	204,416	210,569
Operating Expenses		3,294,733	3,350,333	3,406,088	3,462,053	3,526,979	3,597,240	3,672,621	3,752,233	3,833,216	3,914,879	4,000,104
Revenue Requirement		3,397,875	3,482,822	4,092,316	4,194,624	4,299,490	4,401,018	4,508,036	4,620,344	4,737,452	4,861,860	4,993,070
Required Return		1,583,502	1,545,694	1,509,437	1,474,514	1,440,828	1,408,739	1,377,437	1,347,716	1,319,643	1,293,170	1,267,287
Operating Expenses		3,294,733	3,350,333	3,406,088	3,462,053	3,526,979	3,597,240	3,672,621	3,752,233	3,833,216	3,914,879	4,000,104
Revenue Requirement		4,878,235	4,896,027	4,915,525	4,936,567	4,967,807	5,005,979	5,055,058	5,099,949	5,152,569	5,211,949	5,272,129
Required Rate Increase		43.57%	40.58%	38.12%	36.16%	34.54%	33.15%	31.95%	30.90%	30.00%	29.20%	28.50%
Proposed Rate Increase		1	2	3	4	5	6	7	8	9	10	11
Rate Increase Scenario		0	1	2	3	4	5	6	7	8	9	10
DCF Period 1: No Rate Increases afterward Periods 2,1 (Input 2)												
No Rate Increases (Input 2)	21,279,647.00											
Modest Rate Increases: 6% periods 1, 6, 9, 12, 15, & 18 (Input 4)												
Modest Rate Increases: (Input 4)												
Required Rate Increases: 15% period 3, 12% period 6, 10% period 9, 6% period 12, 6% period 15, 6% period 18 (Input 6)												
Required Rate Increases: (Input 6)												

East Norriton Township Pennsylvania
 East Norriton Sanitary Sewer System
 Wastewater Collection and Treatment System
 Potential Purchaser: Investor-Owned Utility
 As of October 29, 2018

Year	1.5	Periods: 6-15	1.6 & beyond	4	1	2	3	4	5	6	7	8	9
					0.0%	0.0%	0.0%	7.5%	0.0%	0.0%	0.0%	0.0%	0.0%

East Norriton Township Pennsylvania
 East Norriton Sanitary Sewer System
 Wastewater Collection and Treatment System
 Potential Purchaser: Investor-Owned Utility
 As of October 28, 2018

	15	16	17	18
Income Statement				
Revenue				
Annual Revenue Growth Rate				
Subscriber Growth Rate (Annually)	0.0%	0.0%	0.0%	0.0%
Periods Subscriber Growth	0.0%	0.0%	0.0%	0.0%
Growth	0.0%	0.0%	0.0%	0.0%
Rate Case Achieves	0.0%	0.0%	0.0%	0.0%
Period for Periodic Growth	3			
Periodic Rate Case (years)				
Required Rate Increase	0.0%	0.0%	0.0%	0.0%
Proposed Rate Increase	2.2%	2.2%	2.2%	2.2%
Total Revenue Adjustments				
Base and Forecast	3,315,000	7,349,128	7,449,128	7,790,076
Operating Expenses				
Administration	487,787	215,856	218,015	224,917
Administration Rate of Change	1.0%	1.0%	1.0%	1.0%
Contracted services	1,872,446	3,372,474	3,372,171	3,647,342
Contracted services Rate of Change	4.0%	4.0%	4.0%	4.0%
Repairs and maintenance	75,000	116,848	120,153	127,683
Repairs and maintenance Rate of Change	3.0%	3.0%	3.0%	3.0%
Salaries and wages	345,600	368,138	372,520	375,477
Salaries and wages Rate of Change	3.0%	3.0%	3.0%	3.0%
Property Taxes	31,000,000	29,817,035	29,817,035	26,180,817
PT Rate, % of Beginning net plant	0.002%	0.002%	0.002%	0.002%
Book Depreciation (based on Beginning Year Property Plant & Equipment)	628,929	582,312	581,107	476,251
Total Operating Expense	1,923,281	4,111,136	4,133,069	4,566,801
Cost of Operation as % of Revenues (Calculated)	66.7%	61.2%	61.2%	62.2%
Operating Expenses less Depreciation	3,291,354	3,789,697	3,913,000	4,111,316
Operating Income	1,993,435	2,469,181	2,934,041	2,941,750
Nonoperating Revenues (Expenses)				
Interest Income				
Interest Expense				
Interest Eto as % of Debt				
Total nonoperating (revenues) (expenses)	4.63%			
Income (loss) before State and Federal Taxes	1,750,782	2,244,185	2,719,630	2,784,285
State and Federal Taxes	308,801	648,345	793,475	804,169
State and Federal Tax Rate	28.89%	28.89%	28.89%	28.89%
Income After Taxes	1,244,981	1,565,840	1,948,151	1,979,876
Income After Taxes plus interest	1,451,610	1,782,482	2,122,562	2,137,411
Earnings before interest, Taxes, Depreciation, & Amortization	2,581,140	2,983,316	3,415,346	3,418,541
Income (loss) before State and Federal Taxes	1,750,782	2,244,185	2,719,630	2,784,285
Book Depreciation	(628,929)	(582,312)	(581,107)	(476,251)
Tax Depreciation	(906,671)	(1,014,485)	(1,011,234)	(1,035,679)
Difference Tax over Book Depreciation	(275,749)	(432,173)	(432,103)	(559,428)
Income Adjusted for Tax Depreciation	1,404,040	1,709,641	2,122,323	2,225,317
Income Tax Rate	28.89%	28.89%	28.89%	28.89%
Income Taxes	406,783	517,762	519,969	642,894
Income After Tax	1,007,257	1,271,879	1,572,354	1,582,423
Deferred Income Taxes	(99,018)	(130,770)	(141,246)	(161,475)
Accumulated Deferred Income Taxes	(328,071)	(889,338)	(1,030,584)	(1,482,381)
Income After Taxes (Book Depreciation) Plus Deferred Taxes	1,244,981	1,565,840	1,948,151	1,979,876
Plus Interest	206,629	186,647	174,411	157,545

East Norriton Township Pennsylvania
 East Norriton Sanitary Sewer System
 Wastewater Collection and Treatment System
 Potential Purchaser: Investor-Owned Utility
 As of October 29, 2018

	10	11	12	13	14	15	16	17	18
	1,550,628	1,586,567	1,877,312	1,913,070	1,949,192	2,174,895	2,172,677	2,083,074	2,298,896
After Tax Income Cash Flow	10	11	12	13	14	15	16	17	18
Balance Statement									
Assets									
Current Asset Balance	117,614	130,101	130,008	132,918	133,841	146,083	146,983	146,983	155,802
CL as % of Revenue	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%
Balance Statement									
Property, Plant & Equipment									
Total PP&E	21,954,588.05	21,954,351.06	24,776,487.05	24,803,403.05	24,935,850.05	25,273,696.05	25,273,696.05	25,877,424.05	26,140,837.05
Begin Balance	273,494.00	379,390.00	485,394.00	591,503.00	697,713.00	804,031.00	910,349.00	1,016,667.00	1,122,985.00
Additions	156,701.00	57,474.00	58,238.00	159,056.00	159,867.00	60,492.00	61,529.00	62,160.00	62,796.00
Retirements	23,954,351.05	24,276,267.05	24,601,403.05	24,935,850.05	25,273,696.05	25,617,035.05	25,877,424.05	26,340,837.05	26,407,314.05
End Balance	23,954,351.05	24,276,267.05	24,601,403.05	24,935,850.05	25,273,696.05	25,617,035.05	25,877,424.05	26,340,837.05	26,407,314.05
Book Depreciation of Property, Plant & Equipment									
Total Book Depreciation	6,543,454.67	6,713,686.46	7,258,695.27	7,783,051.32	8,288,483.48	8,767,612.83	9,228,451.73	9,673,078.29	10,100,146.37
Begin Balance	(625,938.38)	(603,478.81)	(581,010.55)	(562,484.16)	(542,313.35)	(521,306.30)	(506,151.56)	(489,414.08)	(476,750.58)
Depreciation	56,697.00	57,470.00	58,238.00	59,052.00	59,863.00	60,688.00	61,525.00	62,360.00	63,202.00
Retirements	(6,712,666.45)	(7,258,695.27)	(7,782,051.32)	(8,288,483.48)	(8,767,912.83)	(9,228,451.73)	(9,673,078.29)	(10,100,146.37)	(10,514,804.95)
End Balance	17,494,113.38	17,341,664.60	17,017,571.78	16,621,351.73	16,650,366.57	16,509,264.22	16,386,583.32	16,204,345.76	16,080,400.68
Net Plant	17,359,278.80	17,137,772.78	16,951,409.71	16,783,285.57	16,841,646.22	16,535,366.12	16,351,328.76	16,187,473.68	16,048,811.10
Total Asset	568,670.71	583,911.51	599,645.03	614,484.50	623,221.78	648,992.06	665,312.74	682,057.94	700,679.14
Tax Depreciation of Property, Plant & Equipment									
Total MACRS Depreciation	56,203.00	57,474.00	58,238.00	59,052.00	59,863.00	60,688.00	61,525.00	62,360.00	63,202.00
Begin Balance	(911,968.71)	(916,430.33)	(921,887.03)	(928,428.50)	(936,156.78)	(945,069.66)	(954,167.94)	(963,451.94)	(972,921.14)
Depreciation	23,954,351.05	24,276,267.05	24,776,487.05	24,803,403.05	24,935,850.05	25,273,696.05	25,273,696.05	25,877,424.05	26,140,837.05
End Balance	23,042,382.34	23,359,837.52	23,854,600.02	24,385,421.55	24,905,339.27	25,429,314.95	25,952,317.31	26,474,866.11	27,001,419.01
Net Plant	988,670.71	983,911.51	999,645.03	1,014,484.50	1,031,221.78	1,048,992.06	1,066,837.74	1,084,743.94	1,102,679.14
Tax	(625,938.38)	(603,478.81)	(581,010.55)	(562,484.16)	(542,313.35)	(521,306.30)	(506,151.56)	(489,414.08)	(476,750.58)
Books	(342,741.93)	(380,434.71)	(418,014.98)	(452,000.44)	(488,911.43)	(527,265.16)	(569,484.18)	(614,207.94)	(661,506.50)
Balance Statement									
Current Liabilities	48,325	88,151	97,544	99,689	101,881	110,317	110,237	110,237	116,851
CL as % of Revenue	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%

OCI Investor Owned

**East Norriton Township Pennsylvania
East Norriton Sanitary Sewer System
Wastewater Collection and Treatment System
Potential Purchaser: Investor-Owned Utility
As of October 28, 2018**

	Base	1-5	6-15	16 & beyond	10	11	12	13	14	15	16	17	18
Noncurrent Liabilities													
Long Term Debt, Notes payable, net of current portion Beg	5,300,000.05	4,488,571.05	4,488,571.05	4,488,571.05	4,194,320.05	4,194,320.05	4,194,320.05	4,194,320.05	4,054,509.05	3,919,359.05	3,788,714.05	3,662,424.05	3,540,343.05
Additional Debt													
Debt Repayment													
End Long Term Debt, Notes payable, net of current portion End	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00
Total noncurrent liabilities													
					4,488,571.05	4,488,571.05	4,194,320.05	4,194,320.05	4,054,509.05	3,919,359.05	3,788,714.05	3,662,424.05	3,540,343.05
Deferred Tax Liabilities													
Begin Balance	429,059	528,077	528,077	528,077	637,985	637,985	637,985	637,985	889,338	1,030,584	1,182,917	1,338,373	1,482,381
Additions to Deferred Asset	99,018	109,508	109,508	109,508	130,770	130,770	130,770	130,770	145,456	145,456	145,456	145,456	161,475
Total Deferred Tax Liability	528,077	637,585	637,585	637,585	768,755	768,755	768,755	768,755	1,030,584	1,182,917	1,338,373	1,482,381	1,643,856
Total Liabilities	5,104,858.05	5,107,088.05	5,107,088.05	5,107,088.05	5,053,326.05	5,053,326.05	5,053,326.05	5,053,326.05	5,051,826.05	5,081,868.05	5,101,034.05	5,132,961.05	5,183,039.05
Equity													
Proportion of Capital	70%												
Beginning Equity Capital	14,700,000	18,517,906	18,517,906	18,517,906	19,645,205	19,645,205	19,645,205	19,645,205	22,520,081	24,012,450	25,828,956	27,562,280	29,206,297
Additions to Equity (Retained Earnings)													
Deductions from Equity	0	0	0	0	0	0	0	0	0	0	0	0	0
Ending Equity Capital	18,517,906	19,645,205	19,645,205	19,645,205	21,064,052	21,064,052	21,064,052	21,064,052	24,012,450	25,828,956	27,562,280	29,206,297	31,008,162
Operating Income	1,957,411	1,995,435	1,995,435	1,995,435	2,391,759	2,430,832	2,469,161	2,510,441	2,943,327	3,278,327	3,646,578	4,047,780	4,482,790
Return On Equity	10.57%	10.16%	10.16%	10.16%	11.35%	10.79%	10.79%	10.79%	10.28%	11.28%	10.09%	9.06%	9.47%
Total Liabilities & Stockholders Equity	23,622,764	24,712,293	24,712,293	24,712,293	26,114,670	26,114,670	26,114,670	26,114,670	29,064,276	30,911,824	32,663,324	34,339,258	36,251,201
Assets less Liabilities & Stockholders Equity	(6,263,485)	(7,574,520)	(7,574,520)	(7,574,520)	(8,163,260)	(8,163,260)	(8,163,260)	(8,163,260)	(12,422,670)	(14,376,258)	(16,311,995)	(18,151,784)	(20,202,390)
Capital Expenditures and Changes in Working Capital													
Capital Expenditures	373,484.00	379,390.00	379,390.00	379,390.00	385,394.00	385,394.00	385,394.00	385,394.00	391,593.00	404,031.00	421,918.00	440,373.00	459,883.00
Changes to Working Capital													
Current Assets	66,300	120,201	120,201	120,201	130,058	130,058	130,058	130,058	135,843	146,983	158,983	171,983	185,983
Current Liabilities	49,725	90,151	90,151	90,151	97,543	97,543	97,543	97,543	101,883	110,237	119,237	128,237	137,237
Working Capital	16,575	30,050	30,050	30,050	32,515	32,515	32,515	32,515	33,960	36,746	39,746	42,746	45,746
Changes to Working Capital	634	646	646	646	2,465	2,465	2,465	2,465	730	2,786	3,102	3,418	3,734
CASH FLOW													
Income from Operations	1,451,610	1,476,659	1,476,659	1,476,659	1,756,562	1,784,487	1,812,412	1,840,337	2,122,562	2,272,221	2,421,880	2,571,539	2,721,198
Non Cash Expense (depreciation)	625,929	603,479	603,479	603,479	581,610	562,484	543,358	524,232	503,103	481,977	460,851	439,725	418,600
Capital Expenditures	373,484	379,390	379,390	379,390	385,394	385,394	385,394	385,394	391,593	404,031	421,918	440,373	459,883
Change in Working Capital	634	646	646	646	2,465	2,465	2,465	2,465	730	2,786	3,102	3,418	3,734
Net Cash Flow	1,703,421	1,700,102	1,700,102	1,700,102	1,954,753	1,951,815	1,948,877	1,945,939	2,236,952	2,211,455	2,186,958	2,162,461	2,137,964
Period	9.5	10.5	10.5	10.5	11.5	12.5	12.5	12.5	13.5	14.5	15.5	16.5	17.5
PW Factor	8.31%	8.31%	8.31%	8.31%	8.31%	8.31%	8.31%	8.31%	8.31%	8.31%	8.31%	8.31%	8.31%
Discount Rate without growth	6.69%	6.69%	6.69%	6.69%	6.69%	6.69%	6.69%	6.69%	6.69%	6.69%	6.69%	6.69%	6.69%
Period Present Worth Factor (PW)													
PW of Cashflow	797,201	794,444	794,444	794,444	778,175	775,966	773,757	771,548	663,617	702,403	641,322	580,241	519,160
Accumulated PW of Cashflows	15,829,761	8,310,752	9,089,491	9,868,230	10,646,969	11,425,708	12,204,447	12,983,186	13,761,925	14,540,664	15,319,403	16,098,142	16,876,881
CASH FLOW													
Income from Operations	1,001,257	1,006,391	1,006,391	1,006,391	1,274,422	1,279,556	1,284,690	1,289,824	1,573,199	1,598,333	1,623,467	1,648,601	1,673,735
Depreciation	(968,671)	(983,914)	(983,914)	(983,914)	(999,645)	(1,014,488)	(1,029,331)	(1,044,174)	(1,059,917)	(1,075,660)	(1,091,403)	(1,107,146)	(1,122,889)
Capital Expenditures	373,484	379,390	379,390	379,390	385,394	385,394	385,394	385,394	391,593	404,031	421,918	440,373	459,883
Change in Working Capital	634	646	646	646	2,465	2,465	2,465	2,465	730	2,786	3,102	3,418	3,734
Net Cash Flow	1,595,810	1,610,269	1,610,269	1,610,269	1,878,000	1,896,689	1,915,378	1,934,067	2,244,874	2,211,455	2,178,036	2,144,617	2,111,198
Period	9.5	10.5	10.5	10.5	11.5	12.5	12.5	12.5	13.5	14.5	15.5	16.5	17.5
PW Factor	8.31%	8.31%	8.31%	8.31%	8.31%	8.31%	8.31%	8.31%	8.31%	8.31%	8.31%	8.31%	8.31%
Discount Rate without growth	6.69%	6.69%	6.69%	6.69%	6.69%	6.69%	6.69%	6.69%	6.69%	6.69%	6.69%	6.69%	6.69%
Period Present Worth Factor (PW)													
PW of Cashflow	797,201	794,444	794,444	794,444	778,175	775,966	773,757	771,548	663,617	702,403	641,322	580,241	519,160
Accumulated PW of Cashflows	15,829,761	8,310,752	9,089,491	9,868,230	10,646,969	11,425,708	12,204,447	12,983,186	13,761,925	14,540,664	15,319,403	16,098,142	16,876,881

**East Norriton Township Pennsylvania
East Norriton Sanitary Sewer System
Wastewater Collection and Treatment System
Potential Purchaser: Investor-Owned Utility
As of October 29, 2018**

Rate	1.5	6-15	16 & beyond	10	11	12	13	14	15	16	17	18
Discount Rate with growth	8.31%	8.31%	8.31%	8.31%	8.31%	8.31%	8.31%	8.31%	8.31%	8.31%	8.31%	8.31%
Discount Rate without growth	6.69%	6.69%	6.69%	6.69%	6.69%	6.69%	6.69%	6.69%	6.69%	6.69%	6.69%	6.69%
Period Present Worth Factor (PW)		0.432	0.399							0.29	0.268	0.247
PW of Cashflow	18,417,720	746,839	749,312	695,878	650,296	634,611	605,470	584,021	558,498	534,796	512,197	490,593
Accumulated PW of Cashflows		6,192,486	6,888,122	7,617,444	8,337,322	8,987,618	9,651,088	10,337,689	11,044,993	11,773,197	12,522,421	13,292,865

Rate Case Forecasts	1.5	6-15	16 & beyond	10	11	12	13	14	15	16	17	18
Rate Base	1,451,610	1,476,659	1,476,659	1,451,610	1,476,659	1,476,659	1,476,659	1,476,659	1,476,659	1,476,659	1,476,659	1,476,659
Plant In Service	1,451,610	1,476,659	1,476,659	1,451,610	1,476,659	1,476,659	1,476,659	1,476,659	1,476,659	1,476,659	1,476,659	1,476,659
Accumulated Book Depreciation												
Working Capital												
Accumulated Deferred Income Tax												
Rate Base	1,451,610	1,476,659	1,476,659	1,451,610	1,476,659	1,476,659	1,476,659	1,476,659	1,476,659	1,476,659	1,476,659	1,476,659
Revenues	1,451,610	1,476,659	1,476,659	1,451,610	1,476,659	1,476,659	1,476,659	1,476,659	1,476,659	1,476,659	1,476,659	1,476,659
O&M Expenses												
Book Depreciation												
Ratemaking Interest Expense												
Book Income (Current-Deferred)												
State & Federal Taxes @ 28.89%												
Net Operating Income												

Income from Operations	1.5	6-15	16 & beyond	10	11	12	13	14	15	16	17	18
Return on Rate Base	7.72%	7.72%	7.72%	7.72%	7.72%	7.72%	7.72%	7.72%	7.72%	7.72%	7.72%	7.72%
Required Return	7.72%	7.72%	7.72%	7.72%	7.72%	7.72%	7.72%	7.72%	7.72%	7.72%	7.72%	7.72%
Authorized Return	7.72%	7.72%	7.72%	7.72%	7.72%	7.72%	7.72%	7.72%	7.72%	7.72%	7.72%	7.72%
After-tax Net Income	1,451,610	1,476,659	1,476,659	1,451,610	1,476,659	1,476,659	1,476,659	1,476,659	1,476,659	1,476,659	1,476,659	1,476,659
Taxes												
Pre-tax Net Income												
Interest Expense												
Operating Income												
Operating Expenses												
Revenue Requirement												

Required Return	1.5	6-15	16 & beyond	10	11	12	13	14	15	16	17	18
Proposed Rate Increase	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Rate Increase Scenario	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Period	10	10	11	12	13	14	15	16	17	18	19	20
0% Period 1, No Rate Increases afterword Periods 2-21 (Input 2)												
No Rate Increases (Input 2)												
Modest Rate Increases: 6% periods 1, 6, 9, 12, 15 & 18 (Input 4)												
Modest Rate Increases: (Input 4)												

Required Rate Increase	1.5	6-15	16 & beyond	10	11	12	13	14	15	16	17	18
Required Rate Increase	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Required Rate Increase	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Required Rate Increase	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Required Rate Increase	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

East Norriton Township Pennsylvania
 East Norriton Sanitary Sewer System
 Wastewater Collection and Treatment System
 Potential Purchaser: Investor-Owned Utility
 As of October 29, 2018

Base	1-5	Periods 6-15	16 & Beyond	4	10	11	12	13	14	15	16	17	18
						0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

East-Normon Township Pennsylvania
 East-Normon Sanitary Sewer System
 Wastewater Collection and Treatment System
 Potential Purchaser: Investor-Owned Utility
 As of October 28, 2018

	Base	1-5	Periods: 6-15	16 & Beyond	19	20	Period 1	Average Period 1-N	All Period
Income Statement									
Revenues									
Annual Revenue Growth (w/ Subscriber Growth Rate (Annually) Periodic Subscriber Growth)	0.0%	3.5%	0.0%	2.2%	0.0%	0.0%	3.07367%	3.69342%	5.67356%
Rate Case Assumptions									
Period for Periodic Growth	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			
Periodic Rate Calls (years)									
Required Rate Increase					21.94%	20.13%			
Proposed Rate Increase					0.0%	0.0%			
Total Revenue Adjustments					7,790,076	7,790,076	3,073,67%	3,693,42%	5,673,56%
Base and Forecast	3,315,000								
Operating Expenses									
Administration	187,787	1.0%	1.0%	1.0%	226,867	229,136			
Administration Rate of Change					1.0%	1.0%			
Contracted services	1,877,446	4.0%	4.0%	4.0%	3,944,365	4,102,764			
Contracted services Rate of Change					4.0%	4.0%			
Repairs and maintenance	75,000	3.0%	3.0%	3.0%	131,513	135,458			
Repairs and maintenance Rate of Change					3.0%	3.0%			
Salaries and wages	355,850	3.0%	3.0%	3.0%	232,236	239,203			
Salaries and wages Rate of Change					3.0%	3.0%			
Property Taxes	31,000,000	0.002%	0.002%	0.002%	26,407,314	26,676,889			
Electricity					528	534			
PT Rate % of beginning net plant					0.002%	0.002%			
Book Depreciation (based on Beginning Year Property Plant & Equipment)					464,693	448,174			
Total Operating Expenses	5,000,802	64.2%	64.2%	64.2%	5,156,469	5,156,469			
Cost of Operation as % of Revenues (Calculation)	4,536,108	4,536,108	4,536,108	4,536,108	4,536,108	4,536,108			
Operating Income	2,778,198	2,778,198	2,778,198	2,778,198	2,778,198	2,778,198			
Nonoperating Revenues (Expenses)									
Interest Income					152,284	147,217			
Interest Exp as % of Debt	4.45%	4.45%	4.45%	4.45%	152,284.00	147,217.00			
Total nonoperating revenues (expenses)					152,284.00	147,217.00			
Income (loss) before State and Federal Taxes					2,625,914	2,625,914			
State and Federal Taxes					763,324	718,318			
State and Federal Tax Rate	28.89%	28.89%	28.89%	28.89%	28.89%	28.89%			
Income After Taxes					1,862,590	1,907,596			
Income After Taxes plus interest					1,862,590	1,907,596			
Earnings before interest, taxes, depreciation & amortization					1,862,590	1,907,596			
Income (loss) before State and Federal Taxes					1,862,590	1,907,596			
Book Depreciation					(464,693)	(448,174)			
Tax Depreciation					(1,069,154)	(1,069,154)			
Difference Tax over Book Depreciation					(594,461)	(611,505)			
Income Adjusted for Tax Depreciation					2,052,519	1,872,825			
Income Tax Rate					28.89%	28.89%			
Income Taxes					592,973	541,009			
Income After Tax					1,459,546	1,331,766			
Deferred Income Taxes					(168,851)	(177,259)			
Accumulated Deferred Income Taxes					(1,812,707)	(1,989,966)			
Income After Taxes (Book Depreciation) Plus Deferred Taxes					1,675,156	1,768,072			
Plus Interest					152,284	147,217			

East Norriton Township Pennsylvania
 East Norriton Sanitary Sewer System
 Wastewater Collection and Treatment System
 Potential Purchaser: Investor-Owned Utility
 As of October 29, 2018

Item	1-5	Periods 6-15	16 & Beyond	19	20	Average
After Tax Income Debt Free				2,196,801	2,091,548	

Balance Statement

Assets
 Current Assets
 Current Asset Balance
 CA as % of Revenues

Balance Statement
 Property Plant & Equipment

Total PP&E
 Begin Balance
 Additions

Retirements
 End Balance

End Balance Check
 Book Depreciation of Property Plant & Equipment

Total Book Depreciation
 Begin Balance
 Depreciation

Retirements
 End Balance

End Balance Check
 Net Plant

Begin Balance
 End Balance

Total Asset

Tax Depreciation of Property Plant & Equipment

Total MACRS Depreciation
 Begin Balance
 Depreciation

Retirements
 End Balance

End Balance Check
 Net Plant

Begin Balance
 End Balance

Tax
 Book

Balance Statement

Liabilities
 Current Liabilities
 Current Liabilities
 CL as % of Revenues

66,300
2.00%

2.00%

2.00%

2.00%

2.00%

11,000,000.00

103,514,064.09

(64,092.81)

(449,373.79)

(10,915,569.77)

64,089.00

(11,300,844.56)

(11,300,844.56)

15,891,009.10

15,761,136.28

15,848,757.40

15,917,131.28

15,804,559.40

(1,048,154.18)

(1,062,938.02)

64,093.00

(998,445.62)

(998,445.62)

26,407,314.05

25,691,176.87

25,950,756.43

(1,049,154.18)

(449,092.82)

(589,461.36)

49,725
1.50%

1.50%

1.50%

1.00%

1.00%

1.00%

1.00%

1.00%

1.00%

1.00%

1.00%

1.00%

1.00%

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East Norriton Township Pennsylvania
 East Norriton Sanitary Sewer System
 Wastewater Collection and Treatment System
 Potential Purchaser: Investor-Owned Utility
 As of October 28, 2018

	Base	1-5	Periods: 6-15	16 & beyond	19	20	Average
Noncurrent Liabilities							
Long Term Debt, Notes payable, net of current portion	6,300,000.05				3,422,332.05	3,308,254.05	
Additional Debt				(114,078)		(110,275)	
Debt Reciprocity				30.00		30.00	
Debt Retirement years	30.00				3,308,254.05	3,197,979.05	
End Long Term Debt, Notes payable, net of current portion							
Total noncurrent liabilities					3,308,254.05	3,197,979.05	
Deferred Tax Liabilities							
Begin Balance				1,643,856	1,643,856	1,812,707	
Additions to Deferred Asset				168,851	168,851	177,259	
Total Deferred Tax Liability				1,812,707	1,812,707	1,990,966	
Total Liabilities							
				5,227,812.05	5,204,796.05		
Equity							
Proportion of Capital	70%						
Beginning Equity Capital	14,700,000			31,068,162	31,068,162	32,829,240	
Additions to Equity (Retained Earnings)				1,761,078	1,761,078	1,657,797	
Deductions from Equity	0			0	0	0	
Ending Equity Capital				32,829,240	32,829,240	34,487,037	
Operating Income				2,789,274	2,789,274	2,633,607	
Return On Equity				8.50%	8.50%	7.64%	
Total Liabilities & Stockholders Equity							
				38,067,062	38,791,833		
Assets less Liabilities & Stockholders Equity							
				(22,148,921)	(23,987,274)		
Capital Expenditures and Changes in Working Capital							
Capital Expenditures				333,017.00	333,017.00	336,866.00	
Changes to Working Capital							
Current Assets	66,300			155,802	155,802	155,802	
Current Liabilities	49,725			116,851	116,851	116,851	
Working Capital	16,575			38,951	38,951	38,951	
CASH FLOW							
Income from Operations				2,027,450	2,027,450	1,915,289	
Non Cash Expense (depreciation)				444,693	444,693	444,374	
Capital Expenditures				(333,017)	(333,017)	(336,806)	
Change in Working Capital				2,139,126	2,139,126	2,027,857	
Net Cash Flows				18.5	18.5	19.5	
Period				8.11%	8.11%	8.11%	
PW Factor				6.69%	6.69%	6.69%	
Discount Rate with growth				0.228	0.228	0.211	
Period Present Worth Factor (PW)				492.281	492.281	6,395,918	
PW of Cashflow				13,433,643	13,433,643	19,829,761	
Accumulated PW of Cashflows							
CASH FLOW							
Income from Operations				1,459,546	1,459,546	1,331,766	
Depreciation				(1,048,154)	(1,048,154)	(1,062,939)	
Capital Expenditures				333,017	333,017	336,806	
Change in Working Capital				2,137,683	2,137,683	2,057,859	
Net Cash Flows				18.5	18.5	19.5	
Period							
PW Factor							

East Norriton Township Pennsylvania
 East Norriton Sanitary Sewer System
 Wastewater Collection and Treatment System
 Potential Purchaser: Investor-Owned Utility
 As of October 29, 2018

	Base	1-5	Periods: 6-15	16 & beyond	19	20	Average
Discount Rate with growth	8.31%				8.31%	8.31%	
Discount Rate without growth	6.69%				6.69%	6.69%	
Period Present Worth Factor (PW)					0.228	0.211	
PW of Cashflow					496,056	6,490,671	
Accumulated PW of Cashflows	18,427,720				11,937,049	18,427,720	

Rate Case Forecasts
 Rate Base

Plant in Service	26,676,889.05						
Accumulated Book Depreciation	(10,915,559.77)						
Working Capital	38,951.00						
Accumulated Deferred Income Tax	(1,812,707)						
Rate Base	13,987,572.28						
Revenues	7,790,076.00						
O&M Expenses	4,536,109.00						
Book Depreciation	464,692.82						
Rate-making Interest Expense	152,294.00						
Book Income (Current-Deferred)	2,636,980.18						
State & Federal Taxes @ 28.89%	761,824.00						
Net Operating Income	2,027,850.18						

Income from Operations
 Return on Rate Base

Income from Operations	2,027,850						
Return on Rate Base	14.45%						
Required Return	7.72%						
Authorized Return	1,079,841						
After-tax Net Income	1,875,156						
Taxes	761,824						
Pre-tax Net Income	2,636,980						
Interest Expense	152,294						
Operating Income	2,789,274						
Operating Expenses	5,000,802						
Revenue Requirement	7,790,076						

Required Return
 Authorized Return

Required Return	1,079,841						
Authorized Return	1,079,841						
After-tax Net Income	1,875,156						
Taxes	761,824						
Pre-tax Net Income	2,636,980						
Interest Expense	152,294						
Operating Income	2,789,274						
Operating Expenses	5,000,802						
Revenue Requirement	7,790,076						

Proposed Rate Increase
 Rate Increase Scenario

Required Return	1,079,841						
Operating Expenses	5,000,802						
Revenue Requirement	6,080,643						
Required Rate Increase	21.94%						
Proposed Rate Increase	10	0%	0%	0%	0%	0%	
Rate Increase Scenario	0	0%	15	20	20	20	

0% Period 1, No Rate Increases
 afterward Periods 2-21 (Input 2)
 No Rate Increases (Input 2)

0% Period 1, No Rate Increases afterward Periods 2-21 (Input 2)	21,729,647.00						
No Rate Increases (Input 2)							
Modest Rate Increases: 6% periods 3, 4, 9, 12, 15, & 18 (Input 4)							
Modest Rate Increases: (Input 4)							
Required Rate Increases: 15% period 3; 12% period 6; 10% period 9; 6% period 12; 6% period 15; 6% period 18 (Input 6)							
Required Rate Increases: (Input 6)							

East Norriton Township Pennsylvania
 East Norriton Sanitary Sewer System
 Wastewater Collection and Treatment System
 Potential Purchaser: Investor-Owned Utility
 As of October 29, 2018

Rate	1-5	6-15	16 & beyond	20	Average
	1.5	6-15	4	0.0%	0.0%

**Township of East Norriton
Utility Valuation Experts' (UVE) Valuation of
East Norriton Wastewater Collection System
Montgomery County, Pennsylvania**

**Appraisal Work Papers
As of October 29, 2018**

**Income Approach
DCF Forecast Parameters
Investor-owned Rate Regulated Water Utility
Periods 1 through 19 & 20 to perpetuity**

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2017-2018 Financial Performance
 2017-2018 Financial Summary
 Revenue Summary
 Expense Summary

Category	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	Total
Revenue															
Operating Revenue	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	10,000,000
Other Revenue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Expenses															
Operating Expenses	800,000	800,000	800,000	800,000	800,000	800,000	800,000	800,000	800,000	800,000	800,000	800,000	800,000	800,000	8,000,000
Other Expenses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Net Income	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	2,000,000
Capital Expenditures															
Operating Capital Expenditures	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	1,000,000
Other Capital Expenditures	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Net Cash Flow	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	1,000,000
Balance Sheet															
Assets															
Current Assets	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	10,000,000
Fixed Assets	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Liabilities															
Current Liabilities	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Long-Term Liabilities	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Equity	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	10,000,000

**Township of East Norriton
Utility Valuation Experts' (UVE) Valuation of
East Norriton Wastewater Collection System
Montgomery County, Pennsylvania**

**Appraisal Work Papers
As of October 29, 2018**

Market Approach

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**East Norriton Township Pennsylvania
East Norriton Sanitary Sewer System
Wastewater Collection and Treatment System
Investor-Owned Utility
As of October 29, 2018**

Market Approach Summary

	Book Ratios	Purchase Price to Depreciated Original Cost (Book Value)	Indicated Market Value
Comparable Sales			
Depreciated Original Cost (AUS Consultants) OCLD	8,407,007.17	1.817	15,275,532
Replacement Cost New less Depreciation RCNLD	27,461,355.67	0.9621	26,420,570
Average			20,848,051
 Use (RCNLD)			 26,420,570
 Financial Markets	 Market Value per Share to Book Value per Share		
Market to Book (equity)	2.97		
Market to Book (equity and debt)	1.90		
 Use (equity and debt)	 1.90 Input		
 Market Conclusion	 Investor Purchaser Owned Value to Depreciated Original Cost (Book Value)		
 East Norriton Sanitary Sewer System	 East Norriton Sanitary Sewer System		
AUS Depreciated Original Cost	8,407,007	1.90	15,973,314
 Market Value			 Indicated Valus \$s
Minimum			15,275,532
Mean			19,223,139
Median			15,973,314
Maximum			26,420,570
 Use (RCNLD)			 26,420,570

**Township of East Norriton
Utility Valuation Experts' (UVE) Valuation of
East Norriton Wastewater Collection System
Montgomery County, Pennsylvania**

**Appraisal Work Papers
As of October 29, 2018**

**Market Approach
Sales Comparison Approach
Acquisitions by:
Aqua PA:
New Garden Township Sewer Authority
Limerick Wastewater System
East Bradford Collection System
Cheltenham Wastewater Collection System
PA American:
McKeesport Wastewater System
Sadsbury Collection System
Exeter Wastewater Collection System
Steeltown Water Distribution and Treatment System
SUEZ:
Mahoning – Water and Wastewater**

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East Norriton Township Pennsylvania
 East Norriton Sanitary Sewer System
 Wastewater Collection and Treatment System
 Investor-Owned Utility
 As of October 29, 2018

Comparable Sales Approach

Market Sales Basis

Description	New Garden Wastewater System	Milkesport Wastewater System	Limbrick Wastewater System	Mahoning Water System	Mahoning Wastewater System	East Bradford Wastewater Collection System	Sadsbury Wastewater Collection System	Everest Wastewater Collection System	Stetson Water System	Chickensham Wastewater Collection System	Simple Average / Standard Deviation	Remove Outliers Weighted Average / Standard Deviation
System Description	Wastewater Collection & Treatment	Wastewater Collection & Treatment	Wastewater Collection & Treatment	Water Treatment & Distribution	Wastewater Collection & Treatment	Wastewater Collection Only	Wastewater Collection Only	Wastewater Collection & Treatment	Water Treatment & Distribution	Wastewater Collection Only		
System Attributes												
Purchase Price	29,500,000	159,000,000	75,100,000	4,734,800	4,765,200	5,000,000	9,250,000	96,000,000	22,500,000	50,250,000	456,100,000	441,600,000
Proportion of Purchase Price to Total	6%	35%	16%	1%	1%	1%	2%	21%	5%	11%	100%	97%
Acquiree	Aqua PA	PA American	Aqua PA	SUEZ PA	SUEZ PA	Aqua PA	PA American	PA American	PA American	Aqua PA		100%
Acquiree Date	Aug 16	Sep 16				20 Dec 17		29 May 18	14 Nov 18	Jun 18		
Customers												
Original Cost												295,350,000
Depreciated Original Cost (NYS Consultants) OCCL	18,567,728	103,915,089	46,153,867			5,883,591	6,138,875	40,057,844	14,433,435	15,784,463	248,626,674	243,041,083
Purchase Price to OCCL	1.6488	1.6001	1.6272			0.8247	1.6292	2.1895	1.5538	1.1825	1.7841	1.5688
Variance to Simple Mean	-0.2053	-0.234	-0.1669			-0.8654	-0.2845	0.6024	-0.2332	1.3894	0.6418	0.3185
Variance to Wtd Mean	-0.2472	-0.2753	-0.2088			-0.9073	-0.3268	0.5665	-0.2771	1.3473		
Replacement Cost New Inv Depreciation FCNLD	30,615,410	160,301,491	86,086,750	6,899,346	7,991,234	9,216,381	8,517,587	99,469,419	23,321,471	49,840,486	485,100,173	458,973,022
Purchase Price to FCNLD	0.9636	0.9919	0.8724	0.532	0.5903	0.5413	1.086	0.964	0.9406	1.0052	0.9402	0.9621
Variance to Simple Mean	0.1142	0.1425	0.023	-0.3174	-0.2333	-0.3081	0.2366	0.1146	0.0912	0.3508	0.0604	0.0004
Variance to Wtd Mean	0.0234	0.0517	-0.0578	-0.4082	-0.3409	-0.3989	0.1458	0.0238	0.0004	0.066	0.0273	0.0009
Customers	2,100	20,020	5,434			1,248	984					

**Township of East Norriton
Utility Valuation Experts' (UVE) Valuation of
East Norriton Wastewater Collection System
Montgomery County, Pennsylvania**

**Appraisal Work Papers
As of October 29, 2018**

**Market Approach
Market Financial Ratios
October 29, 2018**

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East Norriton Township Pennsylvania
 East Norriton Sanitary Sewer System
 Wastewater Collection and Treatment System
 Investor-Owned Utility
 October 29, 2018

Comparable Sales Approach

Financial Basis¹

	Industry Averages	American & Asian Averages	American States Water	American Water	Aqua America	California Water	Connecticut Water	Costal Water Co.	Middletown Water	SIW Corp	York
Price per Share			60.01	88.35	36.9	41.93	60.28	13.51	46.97	60.28	30.36
Book Value per Share			15.2	31.75	11	14.45	24.7	10.45	14.85	25.6	10
Market to Book Equity Ratio			3.95	2.78	3.35	2.9	2.8	1.29	3.16	2.67	3.04
Minimum	1.25	2.78		2.78	3.35						
Mean	2.88	3.055									
Standard Deviation	0.67	0.285									
Weighted Market to Debt Ratio	2.97		9.97643	87.55647	29.69749	8.29451	3.05230	261.38	3.02807	4.47001	1.47159
Median	2.9										
Maximum	3.95	3.35									127.81805
Debt (Total) \$s millions			321.3	8,358.0	2,398.9	844.8	355.7	0.3	188.3	431.3	92.0
Outstanding Shares (millions)			36.73	180.49	177.91	48.07	12.04	14.96	16.39	20.62	13.91
Debt per Share			8.75	46.31	12.93	17.57	21.23	0.02	11.49	20.92	7.12
Equity (Total) \$s millions			2,204.38	15,946.49	6,585.02	2,015.58	834.41	202.16	769.89	1,242.86	392.08
Total Capital (Debt + Equity)			2,525.68	24,304.49	8,983.92	2,860.18	1,090.11	202.46	958.25	1,674.16	484.08
			0.06	0.57	0.21	0.07	0.03	-	0.02	0.04	0.01
Market Value per Share (Equity/Debt)			68.76	134.66	49.83	59.5	90.51	13.53	58.46	81.2	37.48
Book Value per Share (Equity/Debt)			29.95	76.06	23.93	32.02	45.93	10.47	26.34	43.57	17.12
Market to Book (Total Capital) Ratio			2.87	1.73	2.08	1.86	1.97	1.29	2.22	1.87	2.19
Minimum	1.29	1.73									
Mean	2.01	1.905									
Standard Deviation	0.40	0.175									
Weighted Market to Book (Debt&Equity) Ratio	1.90		7.24869	41,046.76	18,439.04	5,319.93	2,147.51	261.18	2,127.31	3,130.68	1,050.13
Variance to W10 Mean	0.1018		0.97	(0.17)	0.18	(0.04)	0.07	(0.61)	0.32	(0.03)	0.39
Minimum	1.97	1.905									
Maximum	2.87	2.08									81,781.23

1. Value Line Investment Survey October 12, 2018

**Township of East Norriton
Utility Valuation Experts' (UVE) Valuation of
East Norriton Wastewater Collection System
Montgomery County, Pennsylvania**

**Appraisal Work Papers
As of October 29, 2018**

**Market Approach
Value Line Investment Surveys**

October 29, 2018

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THE VALUE LINE

Investment Survey®

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Part 3
Ratings
&
Reports

ISSUE 9
Pages 1700-1850

File in the binder in order of issue number, removing previous issue bearing the same number.

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ESPECIALLY NOTEWORTHY:

General Electric is certainly a company in flux. Indeed, the former Dow-30 component is in the midst of reinventing itself, and the going has not been easy, with a dropoff in profits and escalating debt resulting in a more-than-30% year-to-date decline in the stock's value. The October 1st appointment of a new chairman and CEO, which bid shares up about 15% on that trading day, is aimed at righting the ship. Learn more on page 1753.

ABB Ltd., a global provider of a wide variety of power and automation technologies, recently closed on its acquisition of GE Industrial Solutions. Details of the deal can be found on page 1739.

Altra Industrial Motion Corp., has consummated its merger with Fortive's Automation and Specialty platform. The transaction moves Altra into higher-growth categories that suffer far less cyclicality than the company's more-traditional energy and mining markets. Details are on page 1704.

Brooks Automation, Inc., has agreed to sell its cryogenics business lines to Sweden-based Atlas Copco for \$675 million, and Brooks shares initially skyrocketed on the news. Turn to page 1707 for more color on the deal.

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★★ Rank 1 (Highest) for Timeliness
★ Rank 2 (Above Average)

In three parts: Part 1 is the Summary & Index. Part 2 is Selection & Opinion. This is Part 3, Ratings & Reports. Volume LXXIV, No. 9

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Value Line's estimates of sales and earnings growth for individual companies are derived by correlating sales, earnings, and dividends to appropriate components or subcomponents of the Gross Domestic Product, presented below. A more detailed forecast appears periodically in *Selection & Opinion*.

HYPOTHESIZED ECONOMIC ENVIRONMENT 3 TO 5 YEARS HENCE

The hypothesized 2021-2023 economic environment into which earnings are forecast is as follows: Unemployment will average about 4% of the national labor force. There will be no major war in progress at that time. Industrial production will be expanding by 1.5%-2.0% per year. Inflation will continue to be relatively modest. Prices as measured by

the broad-based GDP deflator will advance by nearly 2.5% per year, on average. Long-term interest rates on AAA corporate bonds are projected to average close to 4% in the years 2021-2023. We expect the Federal Reserve to pursue moderately tighter monetary policies except in years in which the economy is slowing or there is a recession. Based on these assumptions, the Gross Domestic Product will average just over \$24,600 billion in the years 2021-2023, a level that is slightly more than 26% above the 2017 total of \$19,487 billion.

Things may turn out differently. But in the absence of knowledge of the future, we use the above assumptions, which appear to be most plausible. Thus we are able to apply a common economic environment to all stocks for the purpose of measuring relative growth potential.

THESE ARE THE NATIONAL INCOME SERIES TO WHICH VALUE LINE SALES, EARNINGS, AND DIVIDEND ESTIMATES ARE CORRELATED

ANNUAL STATISTICS	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018*	2019*	2021-23*
Gross Domestic Product (\$Bill.)	14452	14713	14449	14992	15543	16197	16785	17522	18219	18707	19487	20515	21607	24644
Real GDP (2012 Chained \$Bill.)	15628	15605	15209	15599	15841	16197	16495	16900	17387	17659	18051	18577	19177	20267
Total Consumption (\$Bill.)	10615	10593	10460	10643	10844	11007	11167	11494	11922	12248	12559	12906	13334	14331
Nonresidential Fixed Investment (\$Bill.)	1982	1994	1704	1781	1935	2119	2206	2357	2400	2411	2538	2728	2908	3239
Industrial Prod. (% Change, Annualized)	2.5	-3.4	-11.3	5.7	3.3	2.8	1.9	3.7	-3.3	-0.6	3.1	3.4	2.5	1.8
Housing Starts (Mill. Units)	1.34	0.90	0.55	0.59	0.61	0.78	0.93	1.00	1.11	1.18	1.21	1.29	1.34	1.40
Total Light Vehicle Sales (Mill. Units)	16.1	13.2	10.4	11.6	12.7	14.4	15.5	16.4	17.4	17.5	17.2	17.0	16.8	16.5
Personal Savings Rate (%)	3.7	5.0	6.1	5.6	5.7	7.6	4.8	4.8	7.6	6.7	6.7	6.6	6.4	6.0
National Unemployment Rate (%)	4.6	5.8	9.3	9.6	8.9	8.1	7.4	6.2	5.3	4.9	4.4	3.9	3.5	4.0
AAA Corp Bond Rate (%)	5.6	5.6	5.3	4.9	4.6	3.7	4.2	4.2	3.9	3.7	3.8	3.9	3.6	3.8
10-Year Treasury Note Rate (%)	4.6	3.7	3.3	3.2	2.8	1.8	2.4	2.5	2.2	1.9	2.3	2.9	3.3	3.3
3-Month Treasury Bill Rate (%)	4.4	1.4	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.3	0.9	2.0	2.7	3.0
ANNUAL RATES OF CHANGE														
Real GDP	1.9	-0.3	-2.8	2.5	1.6	2.2	1.8	2.5	2.9	1.6	2.2	2.9	2.9	1.7
GDP Deflator	2.7	1.9	0.8	1.2	2.0	1.8	1.6	1.8	0.9	1.6	2.0	2.4	2.4	2.4
Consumer Price Index	2.9	3.8	-0.3	1.6	-3.1	2.1	1.5	1.6	0.4	1.8	2.1	2.7	2.5	2.2
QUARTERLY ANNUALIZED RATES		2017				2018				2019				
		1st*	2nd*	3rd*	4th*	1st*	2nd*	3rd*	4th*	1st*	2nd*	3rd*	4th*	
Gross Domestic Product (\$Bill.)	19158	19358	19599	19832	20040	20892	20675	20953	21218	21476	21738	21987	21987	
Real GDP (2012 Chained \$Bill.)	17863	17996	18121	18224	18323	18509	18664	18811	18942	19064	19177	19286	19286	
Total Consumption (\$Bill.)	12428	12517	12585	12706	12722	12848	12968	13086	13193	13291	13383	13469	13469	
Nonresidential Fixed Investment (\$Bill.)	2487	2531	2552	2592	2654	2701	2753	2803	2851	2893	2929	2957	2957	
Industrial Production (% Change, Annualized)	1.0	5.0	-1.5	7.7	2.4	6.0	2.8	2.5	2.3	2.5	2.5	2.5	2.5	
Housing Starts (Mill. Units)	1.23	1.17	1.17	1.26	1.32	1.26	1.29	1.30	1.33	1.33	1.33	1.33	1.35	
Total Light Vehicle Sales (Mill. Units)	17.1	16.8	17.1	17.6	17.1	17.2	16.7	16.8	16.8	16.8	16.7	16.7	16.7	

*Estimated

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INDUSTRY TIMELINESS: 71 (of 97)

Historically, the Water Utility Industry has attracted conservative, income-oriented investors. This has been changing of late, however.

The Federal Reserve continued to pursue a more-restrictive monetary policy last month. Treasury notes and bill compete with income stocks for investors' funds. Should the Fed hike short-term rates further, the more attractive they will become on a comparison basis to this group.

Almost every utility has a large capital budget as the companies are trying to modernize the nation's aging pipelines and wastewater facilities.

Consolidation continues in this industry as the market is incredibly splintered.

In the recent past, regulators have generally been constructive when dealing with water utilities. The regulatory climate of a state has a major impact on how a utility performs.

Even though the Water Utility Industry's ranking has moved higher over the past three months, it still is in the third quartile.

Fish or Fowl?

Traditionally, investors have flocked to water utilities for the current income, dividend growth potential, low Beta-coefficients, and well-defined business prospects. These equities tended to trail the market averages during rallies and outperform in downturns. About three years ago, this correlation began to deteriorate. Total returns of this group started to do well in a bull market. It's only been over the past 12 months or so that the previous relationship has returned.

The combined market capitalization of this entire collection of stocks totals less than half the amount of just one large electric utility. Thus, these equities have benefited from demand being much greater than supply. Indeed, only two members in this sector qualify as large cap stocks. Hence, institutional investors looking to have some exposure to the industry, don't have many options. As a result, a premium has to be paid to own these shares.

In the past, yields in this segment have been much higher than that of the typical equity. Currently, many have yields that are less than the average for stocks in the *Value Line* universe. This raises the question: "Are water utility stocks still a yield play?"

Short-Term Interest Rates Keep Rising

The Federal Reserve has made no secret of its intentions to keep hiking the federal funds rate at a gradual pace through 2019 should the economy continue to be strong. The yield on a one-year Treasury bill is now about 2.6%, up from close to zero from several years ago, and 131 basis points higher in the past 12 months. Investors buying a one-year bill are getting 50 basis more than from the yield of the average stock included in the *Value Line Investment Survey*. Treasury bills come with about as little risk as possible. Thus, should rates continue trending upward, accounts seeking income (with as little uncertainty as possible), may well switch from these stocks to the fixed-income market.

America's Antiquated Water Infrastructure

According to a well-known national association of civil engineers, a good portion of our pipes and valves are in desperate need of replacement. In addition, many waste-

water facilities must be upgraded to be in compliance with federal regulations. How did this situation come about? For years, both utilities and state regulators didn't want to annoy water consumers (i.e. voters) by charging higher rates. All parties are now in agreement, however, that on a comparative basis, the price of water services has not kept pace with increases for electricity and other utility bills. Over the past decade or so, water companies have been spending heavily to replace old pipelines. Much still remains to be done, though.

A Positive Regulatory Environment

None of the progress made improving water assets would be possible if state regulators and water utilities did not form constructive relationships. As regulated utilities, what these companies are permitted to earn on investments made in their systems is determined by state commissions. The current status appears to be good for customers and utilities. Investors should always stay abreast of any such changes in the regulatory climate by reading each specific report.

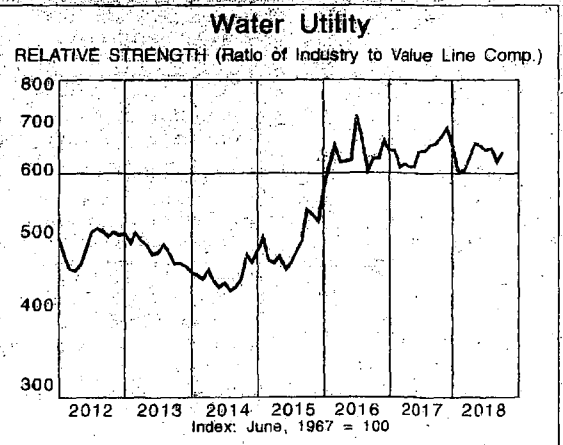
Consolidation

The publicly traded companies we follow here are actually atypical. Most water systems in the country are run by towns, cities, and states. There over 50,000 independent municipally run entities scattered throughout the country. As a result, there is a lot of inefficiencies in the market. A large company can acquire a smaller one and raise margins substantially by integrating it into existing operations. *American Water Works* and *Aqua America* are constantly absorbing multiple tuck-in acquisitions, which enables them to expand their customer bases. This trend could actually accelerate as small water districts lack the financial wherewithal required to modernize their assets.

Conclusion

Despite several stocks being favorably ranked for Timeliness, investors should proceed with caution when evaluating this group. In general, almost all have poor long-term total-returns prospects. The changing interest rate environment is also a potential problem.

James A. Flood



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AMER. STATES WATER NYSE-AWR

RECENT PRICE	60.01	P/E RATIO	34.3	(Trailing: 38.5) (Median: 20.0)	RELATIVE P/E RATIO	1.91	DIV'D YLD	1.9%	VALUE LINE	1784				
TIMELINESS	4	High: 23.1	21.0	19.4	19.8	18.2	24.1	33.1	38.7	44.1	47.2	58.4	61.7	Target Price Range
SAFETY	2	Low: 16.8	13.5	14.9	15.6	15.3	17.0	24.0	27.0	35.8	37.3	41.1	50.1	2021 2022 2023
TECHNICAL	2	LEGENDS 1.35 x Dividends p sh divided by Interest Rate Relative Price Strength 240-1 split '913 Options: Yes Shaded area indicates recession												
BETA	.75 (1.00 = Market)	2021-23 PROJECTIONS Ann'l Total High 60 Low 45 Price Gain (NM) 2% Return -4%												
Insider Decisions to Buy 0 Options 1 to Sell 0 1 0 4 1 3 2 3														
Institutional Decisions 4Q2017 1Q2018 2Q2018 to Buy 104 113 105 to Sell 77 106 95 Net % 24143 25895 27202 Percent shares traded 24 16 8														

2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
6.89	6.99	6.81	7.03	7.88	8.75	9.21	9.74	10.71	11.12	12.12	12.19	12.17	12.56	11.92	12.01	11.80	12.45	12.45	12.45	12.45	12.45
1.27	1.04	1.11	1.32	1.45	1.65	1.69	1.70	2.11	2.13	2.48	2.65	2.67	2.81	2.70	2.96	2.75	3.25	3.25	3.25	3.25	3.25
.67	.39	.53	.66	.67	.81	.78	.81	1.11	1.12	1.41	1.61	1.57	1.60	1.62	1.88	1.85	1.90	1.85	1.85	1.85	1.85
.44	.44	.44	.45	.46	.48	.50	.51	.52	.55	.64	.76	.83	.87	.91	.99	1.08	1.16	1.16	1.16	1.16	1.16
1.34	1.88	2.51	2.12	1.95	1.45	2.23	2.09	2.12	2.13	1.77	2.52	1.89	2.39	3.55	3.08	3.40	3.40	3.40	3.40	3.40	3.40
7.02	6.98	7.51	7.86	8.32	8.77	8.97	9.70	10.13	10.84	11.80	12.72	13.24	12.77	13.52	14.45	15.20	15.95	15.20	15.95	15.95	15.95
30.36	30.42	33.50	33.60	34.10	34.46	34.60	37.06	37.26	37.70	38.53	38.72	38.29	38.50	36.57	36.66	36.60	37.00	36.60	37.00	37.00	37.00
18.3	31.9	23.2	21.9	27.7	24.0	22.6	21.2	15.7	15.4	14.3	17.2	20.1	24.6	25.6	25.7	25.7	25.7	25.7	25.7	25.7	25.7
1.00	1.82	1.23	1.17	1.50	1.27	1.36	1.41	1.00	.97	.91	.97	1.06	1.24	1.34	1.29	1.34	1.29	1.34	1.29	1.34	1.29
3.6%	3.5%	3.6%	3.1%	2.5%	2.5%	2.9%	2.9%	3.0%	3.2%	3.1%	2.7%	2.6%	2.2%	2.2%	2.0%	2.2%	2.0%	2.2%	2.0%	2.2%	2.0%

CAPITAL STRUCTURE as of 6/30/18
 Total Debt \$321.3 mill. Due in 5 Yrs \$100.7 mill.
 LT Debt \$281.0 mill. LT Interest \$19.6 mill.
 (34% of Cap)

Leases, Uncapitalized: Annual rentals \$2.3 mill.
Pension Assets-12/17: \$173.6 mill.
Obliq. \$207.7 mill.

Pfd Stock None

Common Stock 36,733,506 shs. as of 8/1/18

MARKET CAP: \$2.1 billion (Mid Cap)

CURRENT POSITION (\$ MILL)

	2016	2017	6/30/18
Cash Assets	4	2	5.6
Accts Receivable	20.0	26.1	26.6
Other	146.5	129.2	109.0
Current Assets	166.9	155.5	141.2
Accts Payable	43.7	51.0	43.4
Debt Due	90.3	59.3	40.3
Other	43.9	46.4	46.2
Current Liab.	177.9	156.7	129.9

ANNUAL RATES

	10 Yrs	5 Yrs	Est'd '15-'17
Revenues	4.5%	1.5%	4.0%
"Cash Flow"	6.5%	4.5%	6.0%
Earnings	9.0%	7.0%	6.0%
Dividends	7.0%	10.5%	8.0%
Book Value	5.0%	4.5%	4.0%

QUARTERLY REVENUES (\$ mill.)

Calendar	Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2015	100.9	114.8	133.0	110.1	458.6
2016	93.5	112.0	123.8	106.8	436.1
2017	98.8	113.2	124.4	104.2	440.6
2018	94.7	106.9	128.4	105	435
2019	97.0	118	128	107	450

EARNINGS PER SHARE

Calendar	Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2015	.32	.41	.56	.31	1.60
2016	.28	.45	.59	.30	1.62
2017	.34	.62	.57	.35	1.88
2018	.20	.44	.60	.41	1.65
2019	.30	.55	.63	.42	1.90

QUARTERLY DIVIDENDS PAID

Calendar	Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2014	.2025	.2025	.213	.213	.83
2015	.213	.213	.224	.224	.87
2016	.224	.224	.224	.242	.91
2017	.242	.242	.255	.255	.99
2018	.255	.255	.275		

BUSINESS: American States Water Co. operates as a holding company. Through its principal subsidiary, Golden State Water Co., it supplies water to 258,949 customers in 70 cities in 10 counties. Service areas include the metropolitan areas of Los Angeles and Orange Counties. The company also provides electricity to 24,274 customers in Big Bear Lake and San Bernardino County. Provides water & wastewater services to U.S. military bases through its ASUS sub. Sold Chaparral City Wtr. of AZ. (6/11). Employs 758. BlackRock, Inc. owns 11.7% of out. shares; Vanguard, 9.5%; off. & dir. 1.5% (4/18 Proxy). Chairman: Lloyd Ross, Pres. & CEO: Robert Sprowls, Inc. CA. Addr.: 630 East Foothill Blvd., San Dimas, CA 91773. Tel: 909-394-3600, Internet: www.aswater.com.

American States Water raised its dividend. Last quarter, the water utility hiked the per-share payout by \$0.02 to \$0.275. This was about one-third more than we had expected. To reflect this, our dividend estimates for next year and through 2021-2023 have been increased. **It appears that a settlement will be reached in an important pending rate case.** Through its Golden State Water subsidiary, the utility must petition for higher tariffs every three years. The process can take time as rates from 2016 to 2018 were only finalized earlier this year. The outcome for 2018 was below what American States expected and led to a decline in first-half profits. By the end of this year, California regulators were supposed to make a final decision on rates for American States through the 2019-2021 period. In late summer, however, the utility and the Office of Ratepayers Advocates (ORA) agreed to the terms on a new deal. Typically, regulators will go along with the ORA, which makes the outcome almost certain. This also removes much of the regulatory risk faced by the utility. According to the pact, the utility will invest \$335 million in capital infrastructure over the three-year cycle. Excluding certain revenues, the water gross margin will increase by \$6.0 million as compared to 2018. Additional rate hikes of \$10 million and \$12 million are possible in 2020 and 2021, if certain goals are reached. **The nonregulated business will play a more prominent role going forward.** The company has become a major player in the privatization of the water systems on U.S. military bases. The ASUS subsidiary reaches long-term contracts (60 years) with the military that are not subject to caps on profitability. As it already services multiple bases, we look for this number to increase as more installations' water services are auctioned to the high bidder. **These shares are not attractive at this juncture.** For starters, the equity is ranked to underperform the market averages in the year ahead. Moreover, like most of the industry, AWR offers below-average total return prospects over the next three- to five-year period. Additionally, the yield on the stock is now below that of the Value Line median.

James A. Flood **October 12, 2018**

(A) Primary earnings. Excludes nonrecurring gains/losses: '04, '7c; '05, '13c; '06, '3c; '08, '14c; '10, '23c; '11, '10c. Next earnings report due early November. (B) Dividends historically paid in early March, June, September, and December. = Div'd reinvestment plan available. (C) In millions, adjusted for split. (D) Includes Intangibles. As of 12/31/17; \$7.9 million/\$0.22 a share.

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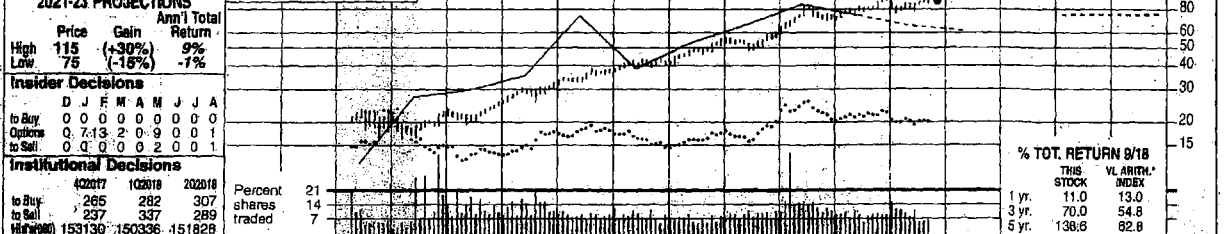
Company's Financial Strength A
Stock's Price Stability 75
Price Growth Persistence 80
Earnings Predictability 95

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AMERICAN WATER NYSE-AWK

RECENT PRICE 88.35 P/E RATIO **26.7** (trailing: 33.6 Median: 19.0) RELATIVE P/E RATIO **1.48** DIV'D YLD **2.2%** VALUE LINE **1785**

TIMELINESS: 2 Raised 10/12/18 SAFETY: 3 New 7/25/08 TECHNICAL: 3 Lowered 9/21/18 BETA: .60 (1.00 = Market)	High: 23.7 Low: 16.5	23.0 25.8 32.8 39.4 45.1 56.2 61.2 85.2 92.4 91.5 16.2 19.4 25.2 31.3 37.0 41.1 48.4 58.9 70.0 76.0	Target Price Range 2021 2022 2023 160 140 120 100 80 60 40 20 15
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Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Revenue per sh					13.08	12.84	14.61	13.98	15.49	15.18	16.25	16.28	16.78	17.72	18.54	18.81	18.90	20.00
Cash Flow per sh					.65	d.47	2.87	2.99	3.56	3.73	4.27	4.36	4.75	5.13	5.26	5.14	5.80	6.30
Earnings per sh A					d.97	d2.14	1.10	1.25	1.53	1.72	2.11	2.06	2.39	2.64	2.62	2.38	3.30	3.50
Div'd Decl'd per sh B=C							40	82	86	90	1.21	.84	1.21	1.33	1.47	1.62	1.78	1.95
Cap'l Spending per sh D							4.31	4.74	6.31	4.38	5.27	5.25	5.50	5.33	6.51	8.04	9.60	9.55
Book Value per sh D					23.86	28.39	25.64	22.91	23.59	24.11	25.11	26.52	27.39	28.25	29.24	30.13	31.75	33.90
Common Shs Outst'g C					160.00	160.00	160.00	174.63	175.00	175.66	176.99	178.25	179.46	178.28	178.10	178.44	181.00	182.00
Avg Ann'l P/E Ratio							18.9	15.6	14.6	16.8	16.7	19.9	20.0	20.5	27.7	33.8		21.5
Relative P/E Ratio							1.14	1.04	.93	1.05	1.06	1.12	1.05	1.03	1.45	1.70		1.20
Avg Ann'l Div'd Yield							1.9%	4.2%	3.8%	3.1%	3.4%	2.0%	2.5%	2.5%	2.0%	2.0%		2.7%

Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Revenue (\$mill)					2336.9	2440.7	2710.7	2666.2	2876.9	2961.9	3011.3	3159.0	3302.0	3357.0	3420	3600		4300
Total Debt \$8368.0 mil. Due in 5 Yrs \$2192.0 mil.					187.2	209.9	267.8	304.9	374.3	369.3	429.8	476.0	468.0	426.0	590	630		845
LT Debt \$6345.0 mil. LT Interest \$320.0 mil. (52% of Cap'l)					37.4%	37.9%	40.4%	39.5%	40.7%	39.1%	39.4%	39.1%	39.2%	43.3%	21.0%	21.0%		21.0%
Income Tax Rate									6.2%	5.1%			5.1%	4.0%	5.0%	5.0%		5.0%
AFUDC % to Net Profit																		5.0%
Long-Term Debt Ratio																		57.5%
Common Equity Ratio																		42.5%
Total Capital (\$mill)					8750.2	9289.0	9561.3	9580.3	9635.5	9940.7	10364	10911	10967	11875	13085	14400		18825
Net Plant (\$mill)					9991.8	10524	11059	11021	11739	12391	12900	13993	14992	16246	17400	18800		21200
Return on Total Cap'l					3.7%	3.8%	4.4%	4.8%	5.4%	5.1%	5.5%	5.7%	5.6%	4.9%	5.0%	5.5%		6.5%
Return on Shr. Equity					4.6%	5.2%	6.5%	7.2%	8.4%	7.8%	8.7%	9.4%	9.0%	7.9%	10.0%	10.5%		10.5%
Return on Com. Equity					4.6%	5.2%	6.5%	7.2%	8.4%	7.8%	8.7%	9.4%	9.0%	7.9%	10.0%	10.5%		10.5%
Retained to Com Eq					3.0%	1.8%	2.8%	3.5%	3.6%	4.7%	4.3%	4.7%	4.0%	2.5%	4.5%	4.5%		4.5%
All Div'ds to Net Prof					34%	65%	56%	52%	57%	40%	50%	50%	56%	66%	55%	56%		56%

CAPITAL STRUCTURE as of 6/30/18
 Total Debt \$8368.0 mil. Due in 5 Yrs \$2192.0 mil.
 LT Debt \$6345.0 mil. LT Interest \$320.0 mil. (52% of Cap'l)

Leases, Uncapitalized: Annual rentals \$15.0 mil.
Pension Assets: 12/17 \$1649.0 mil.
Other: \$2034.0 mil.
Prtd Stock: \$7.0 mil. Prtd Div'd \$3.4 mil.

Common Stock: 180,492,198 shs. as of 7/26/18

MARKET CAP: \$15.9 billion (Large Cap)

Category	2016	2017	6/30/18
CURRENT POSITION (\$mill)			
Cash/Assets	75.0	82.0	95.0
Accts. Receivable	269.0	272.0	324.0
Other	440.0	366.0	414.0
Current Assets	784.0	720.0	833.0
Accts Payable	154.0	195.0	139.0
Debt Due	1423.0	1227.0	2013.0
Other	815.0	903.0	799.0
Current Liab.	2392.0	2325.0	2951.0

ANNUAL RATES Past 10 Yrs. Past 5 Yrs. Est'd '15-'17 to '21-'23

Revenues	3.0%	3.5%	4.0%
"Cash Flow"	50.0%	6.0%	7.0%
Earnings		7.5%	10.0%
Dividends		8.5%	10.0%
Book Value	1.0%	4.0%	6.0%

Cal. ender	QUARTERLY REVENUES (\$ mil.)				Full Year
	Mar.31	Jun.30	Sep.30	Dec.31	
2015	698.0	792.0	896.0	783.0	3159.0
2016	743.0	827.0	930.0	802.0	3302.0
2017	766.0	844.0	936.0	821.0	3357.0
2018	761.0	853.0	971	835	3420
2019	780	890	1050	860	3600

Cal. ender	EARNINGS PER SHARE A				Full Year
	Mar.31	Jun.30	Sep.30	Dec.31	
2015	.44	.68	.96	.56	2.64
2016	.46	.77	.83	.57	2.62
2017	.52	.73	1.12	.01	2.38
2018	.59	.91	1.16	.64	3.30
2019	.60	.88	1.27	.75	3.50

Cal. ender	QUARTERLY DIVIDENDS PAID B=C				Full Year
	Mar.31	Jun.30	Sep.30	Dec.31	
2014	.28	.31	.31	.31	1.21
2015	.31	.34	.34	.34	1.39
2016	.34	.375	.375	.375	1.47
2017	.375	.415	.415	.415	1.62
2018	.415	.455	.455		

AMERICAN WATER WORKS HAS MADE A DECENT-SIZED ACQUISITION IN THE NON-REGULATED AREA. The company spent \$363-million to purchase Rivotal Home Solutions, a leading provider of home warranty products for gas, electric, and other service lines near homes, and heating and cooling systems. Half of the funds came from issuing 2.3 million new shares and the remaining portion was financed with debt. In this same sector, American Water has also agreed to sell most of its Contract Operations Group to Veolia Environnement S.A. **Earnings prospects are solid for this year and next.** All settlements regarding the Freedom Industries chemical spill in West Virginia have finally been completed. A payment from an insurer in the second quarter bumped the utility's share net by \$0.08 on an aftertax basis. With the help of additional revenues from a Missouri rate case, we expect share earnings to reach \$3.30 in 2018. In 2019, with continued cost controls (more below), and additional rate relief, the bottom line may well increase 6%, to \$3.50 a share. **American Water continues to follow the same successful playbook.** As the largest publicly traded water utility, the company has expanded by making multiple small acquisitions every year. The industry consists of thousands of small municipally-run systems around the country. Often these water districts do not have the financial wherewithal to upgrade their outdated infrastructure. Not only does American Water have the finances to do this, but due to economies of scale, it is also able to integrate the tuck-in acquisition and lower expenses and raise margins significantly. We expect this strategy to remain the driving force behind the company's growth. **What about the stock?** Our ranking system pegs these shares to outperform the market averages in the year ahead. Investors should be aware, however, that many water utilities are trading near historic premiums. Indeed, although the company has strong dividend growth prospects, the equity has a yield that is basically in line with the Value Line median. Moreover, AWK's total return prospects over the pull to 2021-2023 are subpar, even on a risk-adjusted basis.

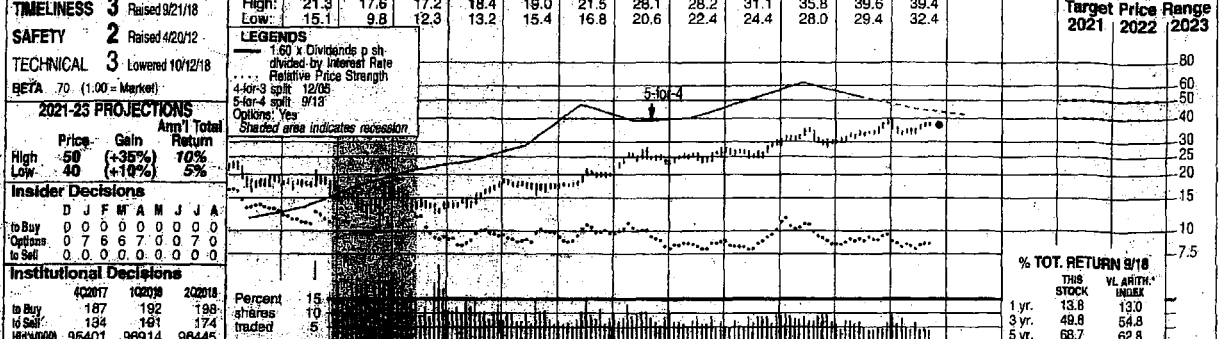
James A. Flood
October 12, 2018

(A) Diluted earnings. Excludes nonrecurring losses: '08, \$4.82; '09, \$2.63; '11, \$0.07. Disc. opr.: '06, (\$0.04); '11, (\$0.03); '12, (\$0.10); '13, (\$0.01). GAAP used as of 2014. Next earnings report due mid-November. Quarterly earnings do not sum in '16 due to rounding.
 (B) Dividends paid in March, June, September, and December. Div. reinvestment available.
 (C) In millions. (D) Includes intangibles. On 12/31/17: \$1,379 billion, \$7.72/share.
 (E) Pro forma numbers for '06 & '07.

Company's Financial Strength: 8+
 Stock's Price Stability: 100
 Price Growth Persistence: 80
 Earnings Predictability: 85

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AQUA AMERICA NYSE-WTR RECENT PRICE **36.90** P/E RATIO **26.0** (Trailing: 26.5 Median: 22.0) RELATIVE P/E RATIO **1.44** DIV'D YLD **2.4%** VALUE LINE **1786**



2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
2.28	2.38	2.78	3.08	3.23	3.61	3.71	3.93	4.21	4.10	4.32	4.32	4.37	4.61	4.62	4.56	4.75	5.00	4.75	5.00	4.75	5.00
.76	.77	.87	.97	1.01	1.10	1.14	1.29	1.42	1.45	1.51	1.82	1.89	1.87	2.07	2.12	2.20	2.40	2.20	2.40	2.20	2.40
.43	.46	.51	.57	.56	.57	.58	.62	.72	.83	.87	1.16	1.20	1.14	1.32	1.35	1.40	1.50	1.50	1.50	1.50	1.50
.26	.28	.29	.32	.35	.38	.41	.44	.47	.50	.54	.58	.63	.69	.74	.79	.85	.91	.91	.91	.91	.91
.96	1.06	1.23	1.47	1.64	1.43	1.58	1.68	1.89	1.90	1.98	1.73	1.84	2.07	2.16	2.69	2.65	2.65	2.65	2.65	2.65	2.65
3.49	4.27	4.71	5.04	5.57	5.85	6.26	6.50	6.81	7.21	7.90	8.63	9.27	9.78	10.43	11.02	11.00	12.00	11.00	12.00	11.00	12.00
191.49	154.31	158.97	164.21	165.41	166.75	189.21	170.61	172.46	173.60	175.43	177.93	178.59	176.54	177.39	177.71	178.25	178.78	178.25	178.78	178.25	178.78
23.6	24.5	25.1	31.8	34.7	32.0	24.9	23.1	21.1	21.3	21.9	21.2	20.8	23.5	23.9	24.7	24.7	24.7	24.7	24.7	24.7	24.7
1.29	1.40	1.33	1.69	1.87	1.70	1.50	1.54	1.34	1.34	1.39	1.19	1.09	1.18	1.25	1.24	1.25	1.24	1.25	1.24	1.25	1.24
2.5%	2.6%	2.3%	1.8%	2.1%	2.8%	2.8%	3.1%	2.8%	2.8%	2.8%	2.4%	2.5%	2.6%	2.3%	2.4%	2.3%	2.4%	2.3%	2.4%	2.3%	2.4%

CAPITAL STRUCTURE as of 6/30/18

Total Debt \$2,299.9 mill. Due in 5 Yrs \$368.4 mill.
LT Debt \$2,181.4 mill. LT Interest \$89.5 mill. (52% of Cap'l)

Pension Assets: 12/17 \$270.4 mill. Oblig. \$321.0 mill.

Pfd Stock None
Common Stock 177,913,909 shares as of 7/24/18

2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
627.0	670.5	726.1	712.0	757.8	768.6	779.9	814.2	819.9	809.5	850	890	890	890	890	890	890	890	890	890	890	890
97.9	104.4	124.0	144.8	153.1	205.0	213.9	201.8	234.2	239.7	250	270	270	270	270	270	270	270	270	270	270	270
39.7%	39.4%	39.2%	42.9%	39.0%	10.0%	10.6%	6.9%	8.2%	6.6%	9.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%
54.1%	55.9%	56.8%	52.7%	52.7%	48.9%	48.5%	50.3%	48.4%	50.6%	51.0%	53.5%	53.5%	53.5%	53.5%	53.5%	53.5%	53.5%	53.5%	53.5%	53.5%	53.5%
45.9%	44.4%	43.4%	47.3%	47.3%	51.1%	51.5%	49.7%	51.6%	49.4%	49.0%	46.5%	46.5%	46.5%	46.5%	46.5%	46.5%	46.5%	46.5%	46.5%	46.5%	46.5%

MARKET CAP: \$6.6 billion (Large Cap)

CURRENT POSITION 2016 2017 6/30/18

2016	2017	6/30/18
3.7	4.2	52.9
97.4	98.6	103.8
13.0	14.4	16.0
14.6	14.0	16.6
128.7	131.2	169.4
59.9	59.2	42.5
157.2	117.4	118.5
84.4	107.9	93.0
307.5	284.5	254.0

ANNUAL RATES

Year	10 Yrs	5 Yrs	1 Yr
Revenues	3.5%	2.0%	5.5%
"Cash Flow"	7.0%	6.5%	6.0%
Earnings	8.5%	9.5%	7.5%
Dividends	7.5%	8.0%	9.0%
Book Value	6.5%	7.5%	5.5%

QUARTERLY REVENUES (\$ mill.)

Calendar	Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2015	190.3	205.8	221.0	197.1	814.2
2016	192.6	203.9	226.6	196.8	819.9
2017	187.8	203.4	215.0	203.3	809.5
2018	194.3	211.9	228.8	215	850
2019	205	225	225	225	880

EARNINGS PER SHARE A

Calendar	Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2015	.27	.32	.38	.17	1.14
2016	.29	.34	.41	.28	1.32
2017	.28	.34	.43	.30	1.35
2018	.29	.37	.43	.31	1.40
2019	.31	.39	.48	.33	1.50

QUARTERLY DIVIDENDS PAID

Calendar	Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2014	.152	.152	.165	.165	.63
2015	.165	.165	.178	.178	.69
2016	.178	.178	.193	.193	.74
2017	.193	.193	.2047	.2047	.79
2018	.2047	.2047	.210	.210	.82

BUSINESS: Aqua America, Inc. is the holding company for water and wastewater utilities that serve approximately three million residents in Pennsylvania, Ohio, North Carolina, Illinois, Texas, New Jersey, Florida, Indiana, and five other states. Has 1,530 employees. Acquired AquaSource, 7/13; North Maine Utilities, 7/15; and others. Water supply revenues: 2017: residential, 80%; commercial, 16%; industrial, wastewater & other, 24%. Off. & dir. own: less than 1% of the common stock; Vanguard Group, 10.0%; Blackrock, Inc., 8.8%; State Street Capital, 5.0% (3/18 Proxy). President & Chief Executive Officer: Christopher Franklin. Incorporated: Pennsylvania. Address: 782 West Lancaster Avenue, Bryn Mawr, Pennsylvania 19010. Tel.: 610-525-1400. Internet: www.aquaamerica.com.

Aqua America's strategy is to expand its customer base by continuously making tack-in acquisitions. Through August, the water utility had already signed agreements to buy six local water systems in 2018. This is part of Aqua's plan, which has been ongoing since the 1990s, to increase its rate base 2% to 3% annually. Because most of the purchases are for a small number of customers, the company will have to complete many of these deals each year to meet its goal. **The fragmented domestic water industry is ripe for this type of consolidation.** In the U.S., most water systems are quite modest in size and are run by municipalities. (There are over 50,000 separate water districts and another 16,000 wastewater systems.) As a result of the high number of operators, there are plenty of areas where a merger can bring about a substantial decline in expenses. Moreover, many towns and cities do not have the financial ability to modernize their aging pipelines. Hence, companies like Aqua (and also industry behemoth American Water Works) can buy and upgrade these assets while reducing customers' water bills.

Capital expenditures should stay at elevated levels. Management plans on spending \$500 million on upgrading its infrastructure this year. Over the pull to 2020, close to \$1.5 billion in outlays is expected to be made.

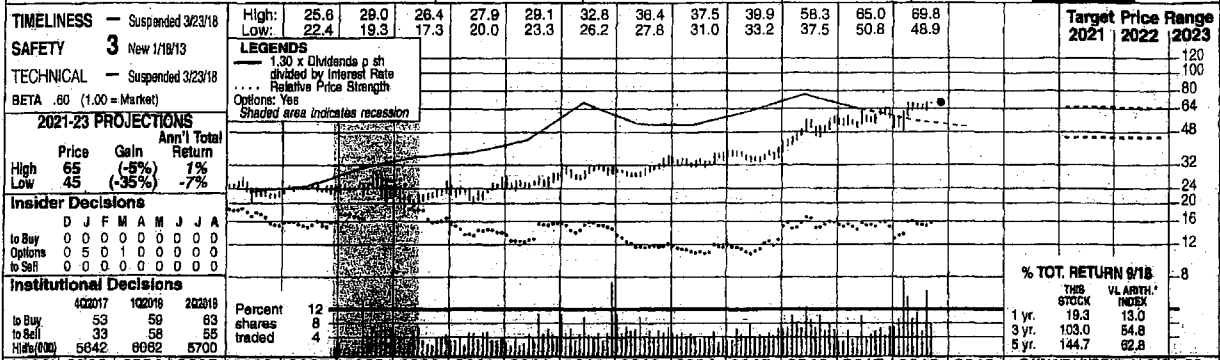
Aqua has the financial standing to execute its game plan. The company is only one of two water utilities that we follow that merits an 'A' Financial Strength rating. Long-term debt makes up about 52% of its total capitalization. This provides Aqua with the flexibility to continue to pour money into modernizing its pipelines and wastewater systems as well as continue to buy small water utilities. **These neutrally ranked shares may have greater long-term appeal than other water utility stocks.** Every regulated utility under review has subpar total return potential through 2021-2023. So, even though WTR's prospects may be lower than the Value Line median, WTR may well be the equity to own for those investors that would like to be involved in this sector of the market.

James A. Flood October 12, 2018

(A) Diluted eqs. Excl. nonrec. gains: '02, '4; '03, '6; '12, '16. Excl. gain from disc. operations: '12, '7; '13, '9; '14, '11. May not sum due to rounding. Next earnings report due Nov. 5th following the market close. (B) Dividends historically paid in early March, June, Sept. & Dec. = Div'd. reinvestment plan available (5% discount). (C) In millions, adjusted for stock splits. Company's Financial Strength A Stock's Price Stability 95 Price Growth Persistence 65 Earnings Predictability 90 To subscribe call 1-800-VALUELINE

CALIFORNIA WATER NYSE-CWT										RECENT PRICE	P/E RATIO		RELATIVE P/E RATIO		DIV'D YLD		VALUE LINE					
										41.93	28.7 (Trailing: 34.7 Median: 28.0)		1.59		1.8%		1787					
TIMELINESS 4	Lowered 3/31/18	High: 22.7	23.3	24.1	19.8	19.4	19.3	23.4	26.4	26.0	36.8	46.2	45.8	Target Price Range								
SAFETY 3	Lowered 7/27/07	Low: 17.1	13.8	16.7	16.9	16.7	16.8	18.4	20.3	19.5	22.5	32.4	35.3	2021	2022	2023						
TECHNICAL 3	Lowered 8/24/18	LEGENDS 1.33 x Dividends p sh divided by Interest Rate Relative Price Strength 2-for-1 split 6/11 Options: Yes Shaded area indicates recession																				
BETA .75	(1.00 = Market)	2021-23 PROJECTIONS Price Gain Ann'l Total High 50 (+20%) 7% Low 35 (-15%) -2%																				
Insider Decisions D J F M A M J J A to Buy 1 1 1 1 1 0 0 0 0 Options 0 0 0 1 9 0 0 0 0 to Sell 0 0 0 2 0 0 0 0 0										Institutional Decisions 4Q2017 1Q2018 2Q2018 to Buy 74 114 87 to Sell 70 85 91 Net Buy 4 29 -4 H/W (Mn) 33903 34461 35009 Percent shares traded 18 12 6										% TOT. RETURN 9/18 THIS STOCK VL ARTH. INDEX 1 yr. 14.5 13.0 3 yr. 107.0 54.8 5 yr. 138.6 62.8		
CAPITAL STRUCTURE as of 6/30/18 Total Debt \$844.6 mill. Due in 5 Yrs \$430.1 mill. LT Debt \$414.5 mill. LT Interest \$36.0 mill. (38% of Cap'l)										MARKET CAP: \$2.0 billion (Mid Cap)										© VALUE LINE PUB. LLC 21-23		
Penion Assets-12/17 \$460.9 mill. Oblig. \$671.3 mill. Pfd Stock None Common Stock 48,070,000 shs.										Current Position										Revenues per sh 15.20 Cash Flow per sh 3.30 Earnings per sh A 1.90 Div'd Decl'd per sh B 1.02 Cap'l Spending per sh 3.65 Book Value per sh C 16.70 Common Shs Outst'g D 50.00 Avg Ann'l P/E Ratio 23.0 Relative P/E Ratio 1.25 Avg Ann'l Div'd Yield 2.4%		
ANNUAL RATES Past										Business: California Water Service Group provides regulated and nonregulated water service to 484,900 customers in 100 communities in the state of California. Accounts for over 94% of total customers. Also operates in Washington, New Mexico, and Hawaii. Main service areas: San Francisco Bay area, Sacramento Valley, Salinas Valley, San Joaquin Valley & parts of Los Angeles, Ac-										Interest costs. Consequently, we are lowering our 2018 and 2019 share-net estimates by \$0.15 and \$0.05, to \$1.30 a share and \$1.60 a share, respectively.		
of change (per sh):										California Water Service Group										Its recently filed rate case ought to drive revenue growth and increased capital investment over the pull to 2021-2023. The company's latest proposal maps out annual revenue increases (which it will pass along to customers via periodic rate hikes) to start in 2020 and run through 2022. These higher rates are used to support general business development, as well as infrastructure and plant upgrades. Specifically, management intends to spend upwards of \$800 million on main replacements and water quality improvements through early next decade. Lastly, customer rate changes are not expected to take effect until 2020.		
10 Yrs. 5 Yrs. to '21-'23										Second-quarter financial results were a mixed bag. Revenues of \$173 million came in on par with our expectation. On the other hand, earnings of \$0.27 a share contracted sharply compared to the previous-year figure, missing our \$0.42 mark. Several factors played a role in the shortfall, including various business development costs, an uptick in salaries and maintenance expenses, as well as higher										This issue is pegged to underperform the broader market over the coming six to 12 months (Timeliness: 4). And at current levels, CWT shares offer limited upside three to five years hence. What's more, the dividend yield is below the Value Line median.		
Revenue 4.0% 1.5% 2.5% Cash Flow 5.5% 3.5% 4.5% Earnings 4.5% 4.0% 3.5% Dividends 2.0% 2.5% 6.5% Book Value 4.5% 5.0% 3.0%										At this time, we think efforts will be geared toward operational enhancements, as we do not see any attractive acquisition targets in the current pipeline.										Nicholas P. Patrikis October 12, 2018		
Quarterly Revenues (\$ mill.)										Full Year										Company's Financial Strength B++ Stock's Price Stability 75 Price Growth Persistence 40 Earnings Predictability 65		
2015 122.0 144.4 183.5 138.5 588.4 2016 121.7 152.4 184.3 151.0 609.4 2017 122.1 171.1 211.7 162.0 666.9 2018 132.2 172.6 215 160.2 680 2019 135 180 220 170 705										2015 .03 .21 .52 .18 .94 2016 d.02 .24 .48 .31 1.01 2017 .02 .39 .70 .29 1.40 2018 d.05 .27 .73 .35 1.30 2019 .11 .40 .74 .35 1.60										2014 .1625 .1625 .1625 .1625 .65 2015 .1675 .1675 .1675 .1675 .67 2016 .1725 .1725 .1725 .1725 .69 2017 .18 .18 .18 .18 .72 2018 .1875 .1875 .1875		
Quarterly Earnings Per Share A										Quarterly Dividends Paid B										© 2018 Value Line, Inc. All rights reserved. Factual material is obtained from sources believed to be reliable and is provided without warranties of any kind. THE PUBLISHER IS NOT RESPONSIBLE FOR ANY ERRORS OR OMISSIONS HEREIN. This publication is strictly for subscriber's own, non-commercial, internal use. No part of it may be reproduced, resold, stored or transmitted in any printed, electronic or other form, or used for generating or marketing any printed or electronic publication, service or product.		
2015 .03 .21 .52 .18 .94 2016 d.02 .24 .48 .31 1.01 2017 .02 .39 .70 .29 1.40 2018 d.05 .27 .73 .35 1.30 2019 .11 .40 .74 .35 1.60										2014 .1625 .1625 .1625 .1625 .65 2015 .1675 .1675 .1675 .1675 .67 2016 .1725 .1725 .1725 .1725 .69 2017 .18 .18 .18 .18 .72 2018 .1875 .1875 .1875										2014 .1625 .1625 .1625 .1625 .65 2015 .1675 .1675 .1675 .1675 .67 2016 .1725 .1725 .1725 .1725 .69 2017 .18 .18 .18 .18 .72 2018 .1875 .1875 .1875		

CONNECTICUT WATER NDC-CTWS



2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	VALUE LINE PUBL. LLC 21-23	
5.77	5.91	6.04	5.81	5.88	7.05	7.24	6.93	7.65	7.93	8.47	8.29	8.45	8.58	8.77	8.87	9.48	9.95	Revenues per sh	12.80
1.78	1.89	1.91	1.82	1.52	1.90	1.95	1.93	2.04	2.11	2.64	2.83	2.97	3.18	3.31	3.39	3.15	3.88	"Cash Flow" per sh	4.50
1.12	1.15	1.16	.88	.81	1.05	1.11	1.19	1.13	1.13	1.53	1.68	1.92	2.04	2.08	2.13	1.65	2.50	Earnings per sh	2.90
.81	.89	.84	.85	.88	.87	.88	.80	.92	.94	.98	.98	1.01	1.05	1.12	1.18	1.24	1.30	Div'd Decl'd per sh	1.52
1.98	1.49	1.58	1.96	1.86	2.24	2.44	3.28	3.06	2.81	2.79	3.02	4.11	4.29	5.93	4.39	4.45	4.00	Cap'l Spending per sh	3.35
10.08	10.46	10.84	11.52	11.80	11.95	12.23	12.87	13.05	13.50	20.95	17.92	18.83	20.01	20.98	24.34	24.70	25.70	Book Value per sh	26.80
7.94	7.97	8.04	8.17	8.27	8.38	8.48	8.57	8.68	8.78	8.85	11.04	11.72	11.19	11.25	12.07	12.78	12.25	Common Shs Outst'g	12.80
24.3	23.5	22.9	28.8	29.0	23.0	22.2	18.4	20.7	23.0	19.4	17.5	17.8	17.8	25.3	25.5	26.5	26.5	Avg Ann'l P/E Ratio	19.0
1.38	1.34	1.21	1.52	1.57	1.22	1.34	1.23	1.32	1.44	1.23	1.03	.82	.88	1.22	1.33	1.33	1.33	Relative P/E Ratio	1.05
3.0%	3.0%	3.1%	3.4%	3.6%	3.6%	3.6%	4.1%	3.9%	3.6%	3.2%	3.2%	3.0%	2.9%	2.3%	2.1%	2.1%	2.1%	Avg Ann'l Div'd Yield	2.9%

CAPITAL STRUCTURE as of 9/30/18	
Total Debt \$255.7 mill.	Due in 6 Yrs \$6.2 mill.
LT Debt \$261.7 mill.	LT Intangibles \$9.0 mill.
	(46% of Cap'l)
Leases, Uncapitalized: Annual rentals \$3 mill.	
Pension Assets-12/17 \$73.1 mill.	Oblig. \$98.6 mill.

CURRENT POSITION			
2016	2017	6/30/18	
Cash Assets	1.8	3.6	3.9
Accounts Receivable	13.0	15.0	13.3
Other	14.8	17.1	21.0
Current Assets	29.4	35.7	38.2
Accts Payable	13.1	11.3	9.4
Debt Due	4.9	6.2	4.0
Other	37.1	24.0	47.5
Current Liab.	55.1	41.5	80.9

BUSINESS: Connecticut Water Service, Inc. is a non-operating holding company, whose income is derived from earnings of its wholly-owned subsidiary companies (regulated water utilities). In 2017, 95% of net income was derived from these activities. Provides water services to 450,000 people in 80 municipalities throughout Connecticut and Maine. Acquired The Maine Water Company, January, 2012; Bliddeford and Saco Water, December, 2012; Heritage Village, February, 2017, Inc. Conn. Has 294 employees. Chairman/President/Chief Executive Officer: Eric W. Thornburg. Officers and directors own 1.2% of the common stock; BlackRock, Inc., 7.0% (4/18 proxy). Address: 93 West Main Street, Clinton, CT 06413. Telephone: (860) 669-8836; internet: www.ctwater.com.

Connecticut Water's merger with SJW Group has been amended. The original agreement (whereby CTWS shareholders would have received 1.1375 shares of SJW stock for each share of CTWS held) has shifted to an all-cash transaction in which CTWS shareholders will receive \$70 per share. The updated valuation places a 33% premium on CTWS shares over the stock's closing price prior to the original transaction, and would represent an all-time high price for Connecticut stock. To wit, the revised deal has once again been unanimously approved by both boards of directors, despite continued efforts by its West Coast utility competitor, California Water Service Group (which recently upped its bid for SJW to \$70 per share, only to be promptly rejected). Moreover, Connecticut Water announced a special mid-November meeting of shareholders to vote on the amended agreement. In our view, it is probable that the deal's projected closing date will be pushed back into early 2019. **From our vantage point, the benefits of the deal have not changed.** Indeed, the marriage is expected to be immediately accretive to SJW's bottom line.

ANNUAL RATES of change (per sh)	Past 10 Yrs	Past 5 Yrs	Est'd '15-'17
Revenues	3.5%	1.0%	6.5%
"Cash Flow"	7.0%	8.0%	5.5%
Earnings	8.5%	10.5%	5.5%
Dividends	2.5%	3.5%	5.5%
Book Value	6.5%	6.5%	3.5%

Cal-ender	QUARTERLY REVENUES (\$ mill.)				Full Year
	Mar.31	Jun. 30	Sep. 30	Dec. 31	
2015	20.0	26.6	28.4	21.0	96.0
2016	21.6	26.1	29.5	21.5	98.7
2017	22.5	27.9	31.8	24.9	107.1
2018	24.9	29.9	33.5	26.7	115
2019	27.0	32.0	35.0	28.0	122

Cal-ender	EARNINGS PER SHARE				Full Year
	Mar.31	Jun. 30	Sep. 30	Dec. 31	
2015	.28	.77	.79	.20	2.04
2016	.28	.89	.84	.07	2.08
2017	.36	.73	.90	.14	2.13
2018	d.10	.39	1.00	.36	1.65
2019	.38	.65	1.05	.42	2.50

Cal-ender	QUARTERLY DIVIDENDS PAID				Full Year
	Mar.31	Jun.30	Sep.30	Dec.31	
2014	.2475	.2475	.2575	.2575	1.01
2015	.2575	.2575	.2675	.2675	1.05
2016	.2675	.2825	.2825	.2825	1.12
2017	.2825	.2975	.2975	.2975	1.18
2018	.2975	.3125	.3125		

(A) Diluted earnings. Next earnings report due late November. (B) Dividends historically paid in mid-March, June, September, and December. (C) Div'd reinvestment plan available. (D) Includes intangibles. In 2017: \$67.0 million/\$5.55 a share.

Company's Financial Strength B+
 Stock's Price Stability 80
 Price Growth Persistence 55
 Earnings Predictability 80

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CONSOL WATER CO. NDC-CWCO

RECENT PRICE **13.51** P/E RATIO **20.8** (Trailing: 33.8 Median: 25.0) RELATIVE P/E RATIO **1.16** DIV'D YLD **2.7%** VALUE LINE **1789**

TIMELINESS 3 Raised 8/24/18	High: 37.5 29.8 21.3 15.1 11.7 9.2 16.9 14.5 13.8 14.7 14.0 15.4	Target Price Range 2021 2022 2023
SAFETY 3 New 1/17/14	Low: 23.3 7.6 6.4 8.1 7.3 6.7 7.5 8.4 9.6 9.8 10.0 12.0	
TECHNICAL 3 Lowered 7/27/18	LEGENDS 2.00 x Dividends p sh divided by Interest Rate Relative Price Strength 2-for-1 split 8/05 Options: Yes Shaded area indicates recession	
BETA .95 (1.00 = Market)	2021-23 PROJECTIONS Ann'l Total Price: Gain Return High 35 (+160%) 28% Low 25 (+65%) 78%	
Insider Decisions D J F M A M J J A to Buy 0 0 0 0 0 0 0 0 0 to Sell 0 0 0 0 0 0 0 0 0		
Institutional Decisions 4Q2017 1Q2018 2Q2018 to Buy 42 40 45 to Sell 21 38 30 Hd'g (%) 77.16 82.03 80.68 Percent shares traded 24 16 8		
% TOT. RETURN 9/18 THIS STOCK VS. ARITH. INDEX 1 yr. 11.0 13.0 3 yr. 28.7 54.8 5 yr. 4.9 62.8		

2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	VALUE LINE PUBL. LLC 21-23	
1.52	1.68	2.02	1.12	2.71	3.41	4.52	3.99	3.49	3.79	4.49	4.35	4.46	3.86	3.89	4.18	4.05	4.20	Revenues per sh	10.00
.50	.63	.77	.37	.87	1.20	.95	1.18	.86	.83	1.17	.96	.80	.89	.95	1.12	1.05	1.15	"Cash Flow" per sh	1.90
.32	.42	.48	.23	.59	.79	.50	.74	.43	.42	.84	.58	.42	.51	.27	.41	.60	.70	Earnings per sh	1.30
.21	.21	.23	.12	.24	.20	.33	.28	.30	.30	.30	.30	.30	.30	.30	.31	.35	.40	Div'd Decl'd per sh	.65
.39	.19	.24	.77	1.83	.54	.46	.18	.09	.96	.31	.29	.32	.21	.23	.31	.20	.20	Cap'l Spending per sh	1.90
2.64	3.69	4.20	2.54	7.49	8.21	8.36	8.53	8.69	8.83	9.20	9.44	9.56	9.81	9.79	9.91	10.45	11.15	Book Value per sh	12.50
7.99	11.37	11.51	23.46	14.13	14.40	14.53	14.54	14.55	14.57	14.59	14.69	14.72	14.78	14.87	14.92	15.00	15.25	Common Shs Outst'g	16.00
21.6	19.3	23.1	80.0	43.0	35.4	37.8	19.0	26.9	22.4	12.4	20.0	28.3	22.7	44.8	29.0	61.0	64.0	Avg Ann'l P/E Ratio	22.5
1.18	1.10	1.22	4.26	2.32	1.88	2.27	1.27	1.71	1.41	.79	1.12	1.49	1.14	2.35	1.41	5.5%	6.0%	Relative P/E Ratio	1.25
3.1%	2.6%	2.0%	.7%	.9%	.7%	1.7%	2.0%	2.6%	3.2%	3.8%	2.6%	2.5%	2.6%	2.5%	2.6%	57%	57%	Avg Ann'l Div'd Yield	2.2%

CAPITAL STRUCTURE as of 8/30/18																		
Total Debt \$3.3 mill. Due in 5 Yrs \$0.3 mill.																		
LT Debt None LT Interest None																		
Looses, Uncapitalized: Annual rentals \$6.6 mill.																		
No Defined Benefit Pension Plan																		
Pld Stock NMF (33,488 shares out) Div'd NMF																		
Common Stock 14,963,963 shs. as of 8/31/18																		
MARKET CAP: \$200 million (Small Cap)																		
CURRENT POSITION 2016 2017 6/30/18 (\$ MILL.)																		
Cash Assets	39.3	47.2	34.1															
Accts Receivable	16.5	15.0	22.2															
Other	5.1	4.5	6.8															
Current Assets	60.9	66.7	63.1															
Accts Payable	4.9	5.7	5.8															
Debt Due	5	7	3															
Other	1.3	1.2	1.3															
Current Liab.	6.7	7.6	7.4															

ANNUAL RATES																		
of change (per sh)																		
Revenues	5.0%	5%	16.5%															
"Cash Flow"	2.0%	5%	11.5%															
Earnings	-3.0%	-4.5%	22.0%															
Dividends	5.0%		13.5%															
Book Value	5.0%	2.0%	4.5%															

QUARTERLY REVENUES (\$ MILL.)																		
Cal-endar	Mar.31	Jun.30	Sep.30	Dec.31	Full Year													
2015	14.7	14.4	14.6	13.4	57.1													
2016	14.0	15.4	14.4	14.1	57.9													
2017	15.6	15.3	16.6	14.8	62.3													
2018	14.3	15.9	15.3	15.5	61.0													
2019	16.0	16.0	16.0	16.0	64.0													
EARNINGS PER SHARE																		
Cal-endar	Mar.31	Jun.30	Sep.30	Dec.31	Full Year													
2015	.13	.15	.12	.11	.51													
2016	.15	.15	.13	.10	.57													
2017	.18	.11	.08	.04	.41													
2018	.14	.14	.16	.16	.60													
2019	.19	.18	.17	.16	.70													
QUARTERLY DIVIDENDS PAID																		
Cal-endar	Mar.31	Jun.30	Sep.30	Dec.31	Full Year													
2014	.075	.075	.075	.075	.30													
2015	.075	.075	.075	.075	.30													
2016	.075	.075	.075	.075	.30													
2017	.075	.075	.075	.075	.30													
2018	.085	.085	.085															

Business: Consolidated Water Co. Ltd. develops and operates seawater desalination plants and water distribution systems in areas where naturally occurring supplies of potable water are scarce or nonexistent. Its desalination process involves reverse osmosis tech. It provides water in the Cayman Islands, Belize, the Bahamas, the British Virgin Islands, and Bali. At 12/31/17, it operated 13 plants with a capacity of 25.8 million gallons per day. Inc.: Cayman Islands. Has 120 employees. President & CEO: Frederick McTaggart. Off/Dir: own 2.5% of stock, First Manhattan, 5.1% (4/18 proxy). Address: Regatta Office Park Windward Three, 4th Floor, West Bay Road P.O. Box 1114 Grand Cayman, KYI-1102, Cayman Islands. Tel: (345) 945-4277. Internet: www.cwco.com.

Progress at Consolidated Water's proposed Mexican project continues to go smoothly. The company, which operates desalination plants, established a subsidiary (NSC) to perform all of the developmental work for a plant in northern Baja California, Mexico. A growing population has left the area with a great need for potable water. More regulatory barriers were just cleared, and Suez International, an equity partner that will build the 100-million-gallons-a-day facility, is almost ready to start construction.

Business at the manufacturing segment is better than it appears. Mostly through its Aerex subsidiary, Consolidated builds and supplies products required for water systems. Management claims that sales from this operation to its Windsor and Abel Castillo plants are considered intercompany sales and are not included in its consolidated results.

The situation at the main Caribbean water systems remains the same. Consolidated operates plants that provide water to the Caymans, the Bahamas, and the British Virgin Islands. Eliminate a charge for Bali (more below), and the Retail Segment is doing decently. Results at the Bulk Segment have been slightly weaker due to higher energy costs, however. Consolidated and the authorities in these countries haven't always seen eye to eye, which has led to protracted legal issues. In any case, regulatory risk remains the main problem here.

The Bali project has not panned out. When the company built a desalination plant "on spec" on the island, it seemed like a safe bet, as Bali has many high-end resorts, a rising population, and a strong need for potable water. Due partially to problems with the government, Consolidated has had to take multiple writeoffs to reflect the lower value of the project.

These shares are not for the typical water utility investor. Outside of the Caribbean, Consolidated isn't guaranteed a return on assets, as is the case with regulated utilities in the U.S. Also, American regulators are generally more constructive than the company's foreign counterparts. On the positive side, the equity offers greater total return potential, but a lot less certainty.

James A. Flood October 12, 2018

(A) Fully diluted earnings. Excludes losses from discontinued operations: '17, \$0.08 a share. Next earnings report due mid-November. (B) Dividends historically paid in late January, April, July, and October. = Dividend reinvestment plan available. (C) In millions adjusted for stock split. (D) Includes Intangibles. As of 12/31/17, \$12.1 million/\$0.81 a share.

Company's Financial Strength B+
 Stock's Price Stability 30
 Price Growth Persistence 20
 Earnings Predictability 45

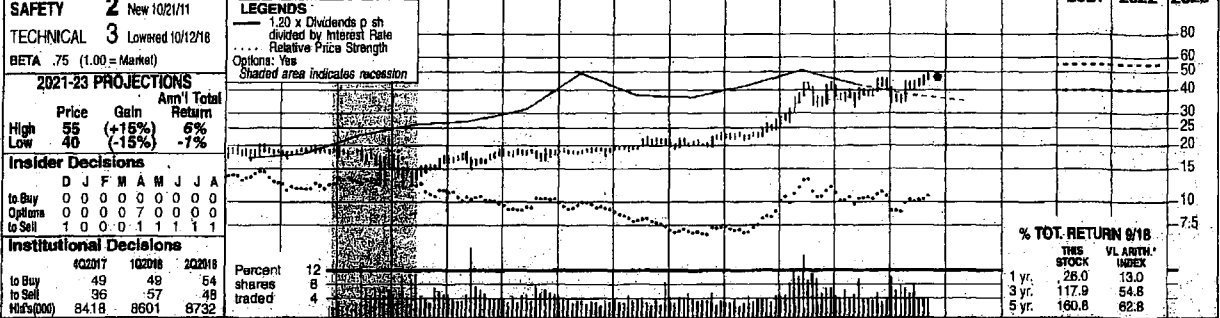
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MIDDLESEX WATER NDQ-MSEX

RECENT PRICE **46.97** P/E RATIO **26.1** (Trailing: 29.9 Median: 20.0) RELATIVE P/E RATIO **1.45** DIV'D YLD **1.9%** VALUE LINE **1790**

TIMELINESS **3** Raised 3/23/18 High: 20.2 19.8 17.9 19.3 19.4 19.6 22.5 23.7 28.0 44.5 46.7 49.0
SAFETY **2** New 10/21/11 Low: 16.9 12.0 11.6 14.7 16.5 17.5 18.6 19.1 21.2 25.0 32.2 34.0
TECHNICAL **3** Lowered 10/12/18
BETA .75 (1.00 = Market)



2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	VALUE LINE PUB. LLC	21-23
5.98	6.12	6.25	6.44	6.16	6.50	6.79	6.75	6.80	6.50	6.98	7.19	7.26	7.77	8.16	8.00	8.25	8.50	Revenues per sh	8.40
1.20	1.15	1.28	1.33	1.33	1.49	1.53	1.40	1.55	1.46	1.56	1.72	1.84	1.97	2.17	2.24	2.65	2.65	"Cash Flow" per sh	3.25
.73	.61	.73	.71	.82	.87	.89	.72	.96	.84	.90	1.03	1.13	1.22	1.38	1.38	1.75	1.85	Earnings per sh A	2.20
.63	.65	.66	.67	.68	.69	.70	.71	.72	.73	.74	.75	.76	.78	.81	.86	.91	.96	Div'd Decl'd per sh B	1.11
1.59	1.87	2.54	2.18	2.31	1.66	2.12	1.49	1.90	1.50	1.36	1.26	1.40	1.59	2.91	3.08	3.05	3.00	Cap'l Spending per sh	2.50
7.39	7.60	8.02	8.26	9.52	10.05	10.03	10.33	11.13	11.27	11.48	11.82	12.24	12.74	13.40	14.02	14.85	15.15	Book Value per sh	16.75
10.36	10.48	11.36	11.58	13.17	13.25	13.40	13.82	15.57	15.70	15.82	15.96	16.12	16.23	16.30	16.35	16.50	16.75	Common Sns Oust'g C	17.00
29.5	30.0	26.4	27.4	22.7	21.6	19.8	21.0	17.8	21.7	20.8	19.7	18.5	19.1	25.6	28.4	28.4	28.4	Avg Ann'l P/E Ratio	21.0
1.28	1.71	1.39	1.46	1.23	1.15	1.19	1.40	1.13	1.36	1.32	1.11	.97	.96	1.34	1.43	1.43	1.43	Relative P/E Ratio	1.15
3.7%	3.5%	3.4%	3.5%	3.7%	3.7%	4.0%	4.7%	4.2%	4.0%	4.0%	3.7%	3.7%	3.3%	2.3%	2.2%	2.3%	2.2%	Avg Ann'l Div'd Yield	2.3%

CAPITAL STRUCTURE as of 6/30/18
Total Debt \$188.3 mill. Due in 5 Yrs \$34.9 mill.
LT Debt \$142.1 mill. LT Interest \$6.5 mill.
(Total interest coverage: 6.9x)
(38% of Cap'l)

Pension Assets -12/17 \$69.2 mill.
Oblig. \$88.0 mill.
Pfd Stock \$2.4 mill. Pfd Div'd: \$ 1 mill.

Common Stock 16,392,350 shs.
as of 7/31/18

MARKET CAP: \$775 million (Small Cap)

CURRENT POSITION (\$MILL)	2016	2017	6/30/18
Cash Assets	3.9	4.9	2.7
Other	22.8	24.3	28.4
Current Assets	26.7	29.2	31.1
Accts Payable	12.3	13.9	16.4
Debt Due	18.2	34.9	48.2
Other	16.6	15.7	19.0
Current Liab.	47.1	64.5	81.6

ANNUAL RATES of change (per sh)	Past 10 Yrs	Past 5 Yrs	Est'd '15-'17 to '21-'23
Revenues	2.5%	3.5%	3.0%
"Cash Flow"	4.5%	7.0%	7.5%
Earnings	5.0%	8.0%	9.0%
Dividends	2.0%	2.0%	5.5%
Book Value	3.5%	3.5%	4.0%

Quarter	Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2015	28.8	31.7	34.7	30.8	126.0
2016	30.6	32.7	37.8	31.8	132.9
2017	30.1	33.0	36.2	31.5	130.8
2018	31.2	34.9	37.5	32.4	136
2019	33.0	36.0	39.0	34.0	142

Quarter	Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2015	22	31	41	28	1.22
2016	29	36	54	19	1.38
2017	27	33	46	32	1.36
2018	27	52	60	36	1.75
2019	32	53	62	38	1.85

Quarter	Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2014	.19	.19	.19	.1925	.76
2015	.1925	.1925	.1925	.19875	.78
2016	.19875	.19875	.19875	.21125	.81
2017	.21125	.21125	.2125	.22375	.86
2018	.22375	.22375	.22375		

BUSINESS: Middlesex Water Company engages in the ownership and operation of regulated water utility systems in New Jersey, Delaware, and Pennsylvania. It also operates water and wastewater systems under contract on behalf of municipal and private clients in NJ and DE. Its Middlesex System provides water services to 61,000 retail customers, primarily in Middlesex County, New Jersey. In 2017, the Middlesex System accounted for 58% of operating revenues. At 12/31/17, the company had 315 employees. Incorporated: NJ. President, CEO, and Chairman: Dennis W. Doll. Officers & directors own 3.5% of the common stock; BlackRock Institutional Trust Co., 6.4% (4/18 proxy). Add: 1600 Ronson Road, Iselin, NJ 08830. Tel: 732-634-1500. Internet: www.middlesexwater.com.

Middlesex Water's stock price has continued to edge higher over the past three months. In fact, shares of the Northeast water provider etched another all-time high (\$49 per share) in recent trading sessions, though the price has retreated modestly since then. Still, over the past three months, the stock is up approximately 10% in value. To no surprise, the investment community is rewarding the company for a stellar second-quarter financial showing.

Net income rose sharply, year over year, in the June period. Middlesex reported earnings of \$0.52 a share, well above last year's \$0.33 tally. Reasons for the advance include slimmer operating and maintenance costs (better margins) and a decreasing income tax burden thanks to federal tax cuts and increased qualified deductions. Calmer weather also played a role. Meanwhile, the company generated revenues of \$34.9 million, about 6% higher than the previous-year figure. Middlesex continues to benefit from an increasing Delaware customer base, as well as greater water usage from industrial and commercial customers in New Jersey.

Our model now calls for high double-digit share-profit growth this year. Due to the recent showing, we are adding a quarter to our 2018 bottom-line estimate, to \$1.75 a share. Too, our 2019 earnings estimate is being raised from \$1.65 a share, to \$1.85 a share.

Substantial investment is expected over the long haul. As mentioned in our previous review, Middlesex's recently introduced capital spending program (Water For Tomorrow) has commenced, starting with a \$52 million project along its New Jersey territory. The construction of the Western Transmission Main will supplement its existing main, which services 300,000 customers through Middlesex County. Over the pull to 2021-2023, we think MSEX will shell out nearly \$300 million in total to revamp its aging water delivery and filtration systems. Ultimately, this spending ought to generate moderate cost savings on the operating front.

There are better options elsewhere at this juncture. The valuation is a bit rich, and capital appreciation potential three to five years out is below average.

Nicholas P. Patrikis October 12, 2018

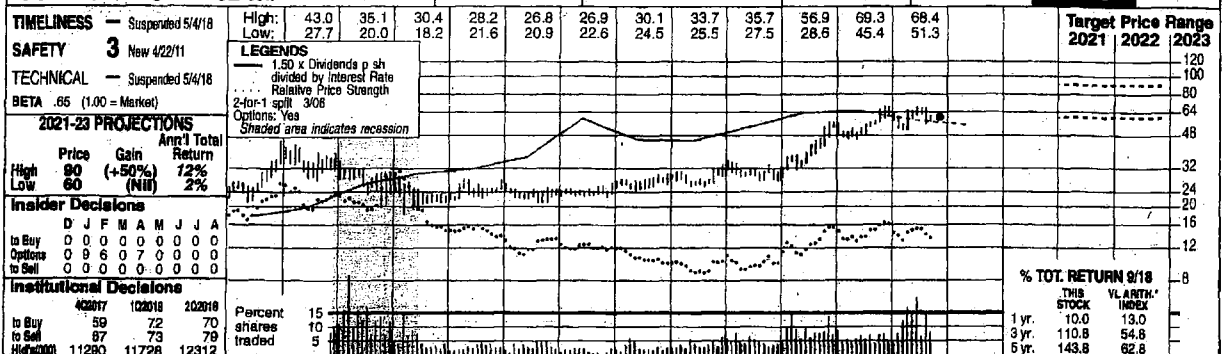
(A) Diluted earnings. Next earnings report due early November.

(B) Dividends historically paid in mid-Feb., May, Aug., and November = Div'd reinvestment plan available.

(C) In millions.

Company's Financial Strength	B++
Stock's Price Stability	65
Price Growth Persistence	40
Earnings Predictability	85

SJW GROUP NYSE-SJW RECENT PRICE **60.28** P/E RATIO **23.3** (Trailing: 24.5 Median: 21.0) RELATIVE P/E RATIO **1.29** DIV'D YLD **1.9%** VALUE LINE **1791**



2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	VALUE LINE PUB, LLC	21-23
7.97	8.20	9.14	9.86	10.35	11.25	12.12	11.88	11.62	12.85	14.01	13.73	15.78	14.97	16.61	18.97	18.80	18.65	Revenue per sh	21.10
1.55	1.75	1.89	2.21	2.38	2.30	2.44	2.21	2.38	2.80	2.97	2.80	4.42	3.86	4.78	5.24	4.75	5.20	"Cash Flow" per sh	5.65
.78	.91	.87	1.12	1.19	1.04	1.08	.81	.84	1.11	1.18	1.12	2.54	1.85	2.57	2.86	2.35	2.90	Earnings per sh A	3.45
.46	.49	.51	.53	.57	.61	.65	.66	.68	.69	.71	.73	.75	.78	.81	1.04	1.12	1.20	Div'd Dec'd per sh B=C	1.45
2.05	3.41	2.31	2.83	3.87	3.87	3.79	3.17	5.66	3.75	5.67	4.88	5.02	5.24	6.95	7.28	8.50	5.25	Cap'l Spending per sh	5.00
6.40	8.11	10.11	10.72	12.48	12.90	13.99	13.66	13.75	14.20	14.71	15.92	17.75	18.83	20.61	22.57	22.60	23.40	Book Value per sh	24.55
18.27	18.27	18.27	18.27	18.28	18.36	18.18	18.50	18.55	18.59	18.67	20.17	20.29	20.38	20.48	20.52	21.00	22.00	Common Shs Outst'g C	23.00
17.3	15.4	19.6	19.7	23.5	33.4	28.2	28.7	29.1	21.2	20.4	24.3	11.2	16.6	15.7	16.8	16.8	16.8	Avg Ann'l P/E Ratio	22.0
.84	.88	1.04	1.85	1.27	1.77	1.58	1.91	1.85	1.33	1.30	1.37	.59	.84	.82	.83	.83	.83	Relative P/E Ratio	1.20
3.4%	3.5%	3.0%	2.4%	2.0%	1.7%	2.3%	2.8%	2.8%	2.5%	3.0%	2.7%	2.6%	2.5%	2.0%	1.8%	1.8%	1.8%	Avg Ann'l Div'd Yield	1.8%

CAPITAL STRUCTURE as of 8/30/18		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Total Debt	\$431.3 mill.	220.3	216.1	216.8	238.0	261.5	275.9	318.7	305.1	339.7	389.2	389.2	389.2	389.2	389.2	389.2	389.2	389.2
LT Debt	\$431.3 mill.	20.2	15.2	16.8	20.8	22.3	23.5	23.5	23.5	23.5	23.5	23.5	23.5	23.5	23.5	23.5	23.5	23.5
LT Interest	\$20.0 mill.	38.5%	40.4%	38.8%	41.1%	41.1%	38.7%	32.5%	38.1%	38.8%	36.7%	31.0%	21.0%	21.0%	21.0%	21.0%	21.0%	21.0%
(LT Interest Coverage: 5.6x)		2.3%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
Leases, Uncapitalized	Annual rentals \$8.7 mill.	48.0%	49.4%	53.7%	56.6%	55.0%	51.1%	51.8%	48.8%	50.7%	48.2%	48.5%	48.0%	48.0%	48.0%	48.0%	48.0%	48.0%
Pension Assets-12/17	\$133.4 mill.	54.0%	50.6%	46.3%	43.4%	45.0%	48.9%	48.4%	50.2%	49.3%	51.8%	51.5%	52.0%	52.0%	52.0%	52.0%	52.0%	52.0%
Common Stock	20,818,102 shs.	470.9	489.8	550.7	607.9	610.2	656.2	744.5	784.8	865.0	894.3	925	980	980	980	980	980	980
MARKET CAP: \$1.2 billion (Mid Cap)		684.2	718.5	785.5	756.2	831.8	898.7	983.0	1036.8	1148.4	1239.3	1275	1300	1300	1300	1300	1300	1300
		5.8%	4.4%	4.3%	4.9%	5.0%	5.0%	8.3%	8.3%	7.4%	7.9%	6.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%
		8.0%	6.0%	6.2%	7.9%	8.1%	7.3%	14.4%	9.9%	12.5%	12.8%	10.5%	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%
		8.0%	6.0%	6.2%	7.9%	8.1%	7.3%	14.4%	9.9%	12.5%	12.8%	10.5%	12.5%	12.5%	12.5%	12.5%	12.5%	12.5%
		3.3%	1.2%	1.2%	3.1%	3.3%	2.8%	10.2%	5.7%	8.6%	8.2%	6.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%
		59%	80%	80%	61%	59%	62%	29%	42%	31%	36%	40%	41%	41%	41%	41%	41%	41%

BUSINESS: SJW Group engages in the production, purchase, storage, purification, distribution, and retail sale of water. It provides water service to approximately 230,000 connections with a total population of roughly one million people in the San Jose area and 14,000 connections that reach about 42,000 residents in the region between San Antonio and Austin, Texas. The company also offers nonregulated water-related services and owns and operates commercial real-estate investments. Has about 411 employees. Officers and directors (including Nancy O. Moss) own 22.9% of outstanding shares (3/18 proxy). Chairman & CEO: Richard Roth. Incorporated: California. Address: 110 West Taylor Street, San Jose, CA 95110. Telephone: (408) 279-7800. Internet: www.sjwater.com.

It has been a roller coaster ride for SJW Group in its quest to finalize a deal with Connecticut Water. There have been several developments worth noting. First, SJW and Connecticut Water reached an agreement to amend their previous merger arrangement to an all-cash acquisition. Under the new structure, SJW will buy the New England utility for \$70 per share in cash, which represents a 33% premium to CTWS' share price prior to the original deal in March, and an all-time high price for the stock. Both boards of directors support the revised deal, with a special shareholder meeting slated to be held in mid-November. Second, California Water Service Group has not made things easy, as the company attempted to yet again derail the marriage. California Water offered a revised proposal to purchase SJW for \$70 per share in cash. Not surprisingly, SJW Group's board of directors rejected the bid, sticking with its initial evaluation that a deal with Connecticut Water delivers superior value to its shareholders. All told, it appears probable that the amended acquisition of CTWS will ultimately go through.

The acquisition is likely to be a boon to SJW's operations. Once finalized, SJW will become one of the nation's largest water and waste water utilities with annual revenues in excess of \$500 million. A rather obvious positive will be the company's wider footprint (California, Connecticut, Texas, and Maine), which ought to generate substantial operational synergies and drive more-efficient customer service. Further, as was a noted deal point under the original agreement, the combined entity will not result in any immediate customer rate increase or employee-related terminations. Lastly, SJW's bottom line ought to get a nice boost, as the deal is expected to be instantly accretive (our current financial projections are exclusive of the acquisition). **This issue remains unranked for Timeliness due to the pending transaction.** At this time, we are hesitant to advise new investors to initiate a position here. However, established accounts looking to roll the dice and hold on to their shares may be rewarded, as the combined entity's prospects are bright.

Nicholas P. Patrikis October 12, 2018

Cal-endar	Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2015	62.1	72.4	83.0	87.6	305.1
2016	61.1	86.9	112.3	79.4	339.7
2017	69.0	102.1	124.6	93.5	389.2
2018	75.0	98.1	125	95.9	395
2019	78.0	105	130	97.0	410

Cal-endar	Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2015	.23	.36	.46	.80	1.85
2016	.16	.82	.92	.67	2.57
2017	.18	.90	.94	.84	2.86
2018	.06	.62	1.00	.67	2.35
2019	.30	.85	1.05	.70	2.90

Cal-endar	Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2014	.1875	.1875	.1875	.1875	.75
2015	.1950	.1950	.1950	.1950	.78
2016	.2025	.2025	.2025	.2025	.81
2017	.2175	.2175	.2175	.3875	1.04
2018	.28	.28	.28		

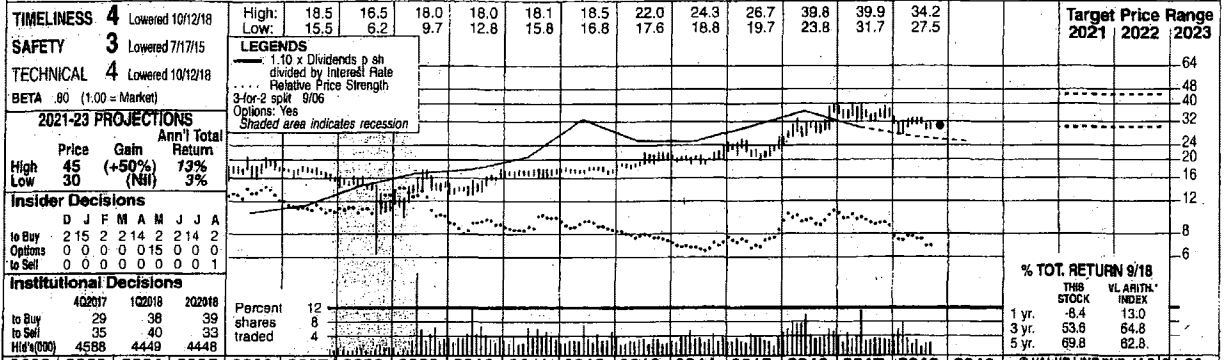
(A) Diluted earnings. Excludes nonrecurring losses: '03, \$1.97; '04, \$3.78; '05, \$1.09; '06, \$16.36; '08, \$1.22; '10, \$0.46. GAAP accounting as of 2013. Next earnings report due late November. Quarterly earnings may not add due to rounding. (B) Dividends historically paid in early March, June, September, and December. (C) Div'd reinvestment plan available. (D) Paid special dividend of \$0.17 per share on 11/17.

Company's Financial Strength B+
 Stock's Price Stability 65
 Price Growth Persistence 45
 Earnings Predictability 45

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YORK WATER NDQ:YORW

RECENT PRICE **30.36** P/E RATIO **26.6** (Trailing: 29.2 Median: 24.0) RELATIVE P/E RATIO **1.48** DIV'D YLD **2.2%** VALUE LINE **1792**



TIMELINESS 4 Lowered 10/12/18
SAFETY 3 Lowered 7/17/15
TECHNICAL 4 Lowered 10/12/18
BETA .80 (1.00 = Market)

2021-23 PROJECTIONS

Price	Gain	Return
High 45	(+50%)	73%
Low 30	(Nil)	3%

Insider Decisions

D	J	F	M	A	M	J	J	A
to Buy	2	1	2	2	1	2	2	1
to Sell	0	0	0	0	0	1	5	0
Options	0	0	0	0	0	0	0	0

Institutional Decisions

to Buy	to Sell	Net
402017	102018	202018
29	36	39
35	40	33
4588	4449	4448

2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021-23
2.05	2.17	2.18	2.58	2.56	2.79	2.89	2.95	3.07	3.18	3.21	3.27	3.58	3.68	3.70	3.77	3.75	3.95	3.95	Revenues per sh
.57	.65	.65	.79	.77	.86	.88	.95	1.07	1.09	1.12	1.19	1.36	1.45	1.42	1.53	1.70	1.80	1.80	"Cash Flow" per sh
.40	.47	.49	.56	.58	.57	.57	.64	.71	.71	.72	.75	.89	.97	.92	1.01	1.10	1.20	1.20	Earnings per sh A
.35	.37	.39	.42	.45	.48	.49	.51	.52	.53	.54	.55	.57	.60	.63	.65	.70	.75	.75	Div'd Decl'd per sh B
.66	1.07	2.50	1.69	1.85	1.69	2.17	1.18	.83	.74	.94	.76	1.10	1.11	1.08	1.95	2.00	1.75	1.75	Cap'l Spending per sh
3.90	4.06	4.65	4.85	5.84	5.97	6.14	6.92	7.19	7.45	7.73	7.98	8.15	8.51	8.88	9.28	10.00	10.90	10.90	Book Value per sh
9.55	9.63	10.33	10.40	11.20	11.27	11.37	12.56	12.69	12.79	12.92	12.98	12.83	12.81	12.85	12.87	13.00	12.90	12.90	Common Shs Outst'g C
26.9	24.5	25.7	26.3	31.2	30.3	24.6	21.9	20.7	23.9	24.4	26.3	23.1	23.5	32.8	34.6	34.0	34.6	34.6	Avg Ann'l P/E Ratio
1.47	1.40	1.36	1.40	1.68	1.61	1.48	1.46	1.32	1.50	1.55	1.48	1.22	1.18	1.72	1.72	1.72	1.72	1.72	Relative P/E Ratio
3.3%	3.2%	3.1%	2.9%	2.5%	2.8%	3.5%	3.6%	3.5%	3.1%	3.1%	2.8%	2.8%	2.6%	2.1%	1.9%	1.9%	1.9%	1.9%	Avg Ann'l Div'd Yield
CAPITAL STRUCTURE as of 6/30/18																			
Total Debt \$92.0 mill. Due in 5 Yrs \$42.5 mill.																			
LT Debt \$81.0 mill. LT Interest \$5.3 mill.																			
(40% of Cap'l)																			
Pension Assets 12/17 \$41.4 mill.																			
Oblig. \$44.8 mill.																			
Pfd Stock None																			
Common Stock 12,914,267 shs.																			
MARKET CAP: \$400 million (Small Cap)																			
CURRENT POSITION																			
(Mill.)																			
Cash Assets 4.2																			
Accounts Receivable 4.3 4.5 4.3																			
Inventory (Avg. Cost) .7 .9 .9																			
Other 3.4 3.2 3.8																			
Current Assets 12.6 8.6 9.0																			
Accts Payable 3.7 3.1 3.4																			
Debt Due 11.0																			
Other 4.5 6.0 4.5																			
Current Liab. 8.2 9.1 18.9																			
ANNUAL RATES																			
of change (per sh)																			
10 Yrs. 5 Yrs. '15-'17																			
Revenues 3.5% 3.5% 6.0%																			
"Cash Flow" 6.0% 6.0% 8.5%																			
Earnings 5.5% 6.5% 9.0%																			
Dividends 3.5% 3.5% 8.0%																			
Book Value 5.0% 3.5% 4.5%																			

Cal-endar	Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2015	11.2	11.9	12.4	11.6	47.1
2016	11.3	11.8	12.6	11.9	47.6
2017	11.3	12.3	12.7	12.3	48.6
2018	11.6	12.0	12.4	12.5	48.5
2019	12.0	12.8	13.3	12.9	51.0

Cal-endar	Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2015	.20	.22	.28	.27	.97
2016	.19	.23	.27	.23	.92
2017	.20	.23	.31	.27	1.01
2018	.20	.26	.33	.31	1.10
2019	.24	.28	.35	.33	1.20

Cal-endar	Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2014	1.431	1.431	1.431	1.431	.572
2015	1.495	1.495	1.495	1.555	.604
2016	1.555	1.555	1.555	1.602	.627
2017	1.602	1.602	1.602	1.666	.647
2018	1.666	1.666	1.666		

York Water is performing better than expected on the profit front. The Pennsylvania-based water utility reported earnings of \$0.26 a share for the June period, a penny ahead of our call. The beat was largely driven by a lower tax rate (a combination of last year's tax cuts and higher deductions from maintenance and repairs). Notably, the company managed to outperform even as operating expenses (increased maintenance costs) are on the rise. Capital spending (more below) is apt to persist through the remainder of this year and next, which ought to keep producing beneficial deductions. Overall, we are boosting both our 2018 and 2019 bottom-line estimates by a nickel, to \$1.10 a share and \$1.20 a share, respectively.

There is a high probability that York's recent rate case filing will go through. As mentioned in our previous review, the company is asking for a \$6 million hike in annual revenue to help recover infrastructure improvements and upgrade costs. Too, the Pennsylvania Public Utilities Commission will also take into account the company's growing customer base when evaluating the case.

Capital investments are poised to accelerate significantly. During the first half of the year, York spent roughly \$7 million on upgrades such as raw water pumping stations and infrastructure improvements and replacements. Management expects this figure to nearly double in the back half of 2018, to approximately \$13 million (total annual spending of about \$20 million). Looking forward, investments are likely to remain elevated through next decade, as a fair share of its infrastructure still needs updating.

The dividend yield is about average at the current quotation. Shares of York Water have edged higher in value since mid-2015, effectively shaving 50 to 60 basis points off its average annual yield over the past two years. But after it gave back a portion of these gains over the course of 2018, coupled with a now higher annual payout, income-seeking accounts may eventually have something to get excited about again.

That said, we continue to recommend investors take a pass on this untimely equity.

Nicholas P. Patrikis October 12, 2018

(A) Diluted earnings. Next earnings report due late November. (C) In millions, adjusted for split.

(B) Dividends historically paid in late February, June, September, and December.

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Company's Financial Strength	B+
Stock's Price Stability	60
Price Growth Persistence	55
Earnings Predictability	90

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**Township of East Norriton
Utility Valuation Experts' (UVE) Valuation of
East Norriton Wastewater Collection System
Montgomery County, Pennsylvania**

**Appraisal Work Papers
As of October 29, 2018**

**Cost of Capital / Required Return
Weighted Cost of Capital**

**AUS Consultants
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8555 West Forest Home Avenue
Greenfield, Wisconsin 53228
Office Telephone: 414-529-5755
J. Weinert's Cell: 414-698-8371
J. Weinert's E-Mail: weinertj@auswest.net**

**Water and Wastewater Cost of Capital
Third Quarter 2018 (10-1-2018)**

As a Investor-Owned Utility

Weighted Cost of Capital (Discount Rate)

(1)	(2)	(2a)	(3)	(3a)	(4)	(4a)	(5)
	Portion of Capital AUS Input	Type of Data	Capital Cost AUS Input	Type of Data	Tax Rate	Tax affect on cost of capital	After-tax Market Capital Cost (2)*(3)*(4a)
Debt	30%	Market ✓	4.45%	Market ✓	28.89% ✓	71.11%	0.95%
Equity	70%	Market ✓	9.95%	Market ✓	0.0%	100.0%	6.97%
Total Capital r	100.0%						7.92%
Growth (g)							1.52% ✓
Rate without Growth: $[(1+r)/(1+g)]-1$							6.31%

Weighted Cost of Capital (Capitlization Rate)

(1)	(2)	(2a)	(3)	(3a)	(4)	(4a)	(5)
	Portion of Capital AUS Input	Type of Data	Capital Cost AUS Input	Type of Data	Tax Rate	Tax affect on cost of capital	Market Capital Cost (2)*(3)
Debt	30%	Market ✓	4.45%	Market ✓	Not Applicable	Not Applicable	1.34%
Equity	70%	Market ✓	9.95%	Market ✓	Not Applicable	Not Applicable	6.97%
Total Capital r	100.0%						8.31%
Growth (g)							1.52%
Rate without Growth: $[(1+r)/(1+g)]-1$							6.69%

Weighted Cost of Capital (Rate of Return on Rate Base)

(1)	(2)	(2a)	(3)	(3a)	(4)	(4a)	(5)
	Portion of Capital AUS Input	Type of Data	Capital Cost AUS Input	Type of Data	Tax Rate	Tax affect on cost of capital	Required Return on Rate Base (2)*(3)
Debt	45%	Embedded ✓	4.99%	Embedded ✓	Not Applicable	Not Applicable	2.25%
Equity	55%	Embedded ✓	9.95%	Market ✓	Not Applicable	Not Applicable	5.47%
Total Capital r	100.0%						7.72%
Growth (g)						Not Applicable	0.00%
Rate without Growth: $[(1+r)/(1+g)]-1$							7.72%

**Township of East Norriton
Utility Valuation Experts' (UVE) Valuation of
East Norriton Wastewater Collection System
Montgomery County, Pennsylvania**

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As of October 29, 2018**

**Cost of Capital / Required Return
Cost of Debt**

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**Value Line Investment Surveys
Water Industry
As of Second Quarter 2018 (7-1-2018)**

S&P Debt Rating	Long Term Debt	Long Term Interest	Long Term Interest Rate (embedde d)
-----------------------	-------------------	--------------------------	---

Input Value Line Input Value Line (4) / (3)

American States Water	281.0	19.6	6.98%
American Water	6,345.0	320.0	5.04%
Aqua American	2,181.4	89.5	4.10%
California Water	414.5	36.0	8.69%
Connecticut Water	251.7	9.0	3.58%
Consolidated Water Company	-	-	
Middlesex Water	142.1	5.5	3.87%
SIW Corporation	431.3	20.0	4.64%
York Water	81.0	5.3	6.54%
	10,128.0	504.9	4.99%
Minimum			3.58%
wtd Mean			4.99%
Mean			5.43%
Median			4.84%
Maximum			8.69%

Debt Rating and Cost of Debt

Embedded	4.99%	wtd mean col 5
Rating (S&P)	A	Input
Market Cost of Debt @Bond Rating Mergent Bond Record	4.45%	Input October 2018
Use	4.45%	AUS Input

Corporate Bond Yield Averages

2012	AV. CORP.	CORPORATE RATINGS				CORPORATE BY GROUPS			PUBLIC UTILITY BONDS				INDUSTRIAL BONDS				RAILROAD BONDS						
		Aaa	Aa	A	Baa	P.U.	IND.	R.R.	Aaa	Aa	A	Baa	Aaa	Aa	A	Baa	Aaa	Aa	A	Baa			
Jan.	4.45	3.85	4.01	4.39	5.23	4.48	4.41	---	Jan.	---	4.03	4.34	5.06	Jan.	3.85	3.98	4.43	5.39	Jan.	---	---	---	---
Feb.	4.42	3.85	3.99	4.39	5.14	4.47	4.37	---	Feb.	---	4.02	4.36	5.02	Feb.	3.85	3.96	4.41	5.26	Feb.	---	---	---	---
Mar.	4.34	3.99	4.14	4.51	5.23	4.59	4.50	---	Mar.	---	4.16	4.48	5.13	Mar.	3.99	4.12	4.53	5.33	Mar.	---	---	---	---
Apr.	4.49	3.96	4.08	4.44	5.19	4.53	4.44	---	Apr.	---	4.10	4.40	5.11	Apr.	3.96	4.06	4.48	5.27	Apr.	---	---	---	---
May	4.33	3.80	3.91	4.26	5.07	4.36	4.30	---	May	---	3.92	4.20	4.97	May	3.80	3.90	4.32	5.17	May	---	---	---	---
June	4.22	3.64	3.78	4.14	5.02	4.26	4.18	---	June	---	3.79	4.08	4.91	June	3.64	3.77	4.18	5.13	June	---	---	---	---
July	4.03	3.40	3.54	3.93	4.87	4.12	3.93	---	July	---	3.58	3.93	4.85	July	3.40	3.49	3.93	4.89	July	---	---	---	---
Aug.	4.09	3.48	3.61	3.99	4.91	4.18	3.99	---	Aug.	---	3.65	4.00	4.88	Aug.	3.48	3.57	3.98	4.93	Aug.	---	---	---	---
Sept.	4.09	3.48	3.68	4.01	4.84	4.17	4.00	---	Sept.	---	3.69	4.02	4.81	Sept.	3.49	3.66	4.00	4.87	Sept.	---	---	---	---
Oct.	3.97	3.47	3.63	3.90	4.58	4.05	3.89	---	Oct.	---	3.68	3.91	4.54	Oct.	3.47	3.58	3.89	4.62	Oct.	---	---	---	---
Nov.	3.92	3.50	3.57	3.87	4.51	3.95	3.88	---	Nov.	---	3.60	3.84	4.42	Nov.	3.50	3.54	3.89	4.68	Nov.	---	---	---	---
Dec.	4.05	3.65	3.70	3.98	4.63	4.10	3.99	---	Dec.	---	3.75	4.00	4.56	Dec.	3.65	3.68	3.96	4.70	Dec.	---	---	---	---

Notes: Moody's Long-Term Corporate Bond Yield Averages have been published daily since 1929. They are derived from pricing data on a regularly replenished population of over 100 seasoned corporate bonds in the US market, each with current outstandings over \$100 million. The bonds have maturities as close as possible to 30 years, with an average maturity of 28 years. They are dropped from the list if their remaining life falls below 20 years or if their ratings change. Bonds with deep discounts or steep premiums to par are generally excluded. All yields are yield-to-maturity calculated on a semi-annual compounding basis. Each observation is an unweighted average, with Average Corporate Yields representing the unweighted average of the corresponding Average Industrial and Average Public Utility observations. Because of the dearth of Aaa-rated railroad term bond issues, Moody's Aaa railroad bond yield average was discontinued as of December 18, 1967. Moody's Aaa public utility average was suspended from Jan. 1984 thru Sept. 1984. Oct. 1984 figure for last 14 business days only. The Railroad Bond Averages were discontinued as of July 17, 1989 because of insufficient frequently tradeable bonds. The July figures were based on 8 business days. Because of the dearth of Aaa rated public utility bond issues, Moody's Aaa public utility bond yield average was discontinued as of December 10, 2001.

**Township of East Norriton
Utility Valuation Experts' (UVE) Valuation of
East Norriton Wastewater Collection System
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**Appraisal Work Papers
As of October 29, 2018**

**Cost of Capital / Required Return
Cost of Equity**

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**Value Line Investment Surveys
Water Industry
As of Second Quarter 2018 (7-1-2018)**

Company	Exchange	Ticker	Valuations	Dividend	Revenues	Cash Flow	Earnings	Dividends	Book Value							
			No.	Yield	Per Share	Per Share	Per Share	Per Share	Per Share							
			17 to 21	17 to 21	17 to 21	17 to 21	17 to 21	17 to 21	17 to 21							
			23	23	23	23	23	23	23							
			Year	Year	Year	Year	Year	Year	Year							
American States Water	NYSE	AWH	1768	10/12/2018	0.75	1.9%	4.5%	4.0%	6.0%	7.0%	10.5%	8.0%	5.0%	4.5%	4.0%	
American Water	NYSE	AWW	1765	10/12/2018	0.6	2.2%	3.0%	4.0%	4.0%	7.0%	6.5%	10.0%	1.0%	4.0%	6.0%	
California American Water	NYSE	CAW	1766	10/12/2018	0.7	2.4%	3.5%	2.0%	5.5%	7.0%	6.5%	8.0%	9.0%	6.5%	5.5%	
Consolidated Water Company	NYSE	CWT	1767	10/12/2018	0.75	1.8%	4.0%	2.5%	4.5%	3.5%	4.5%	2.0%	2.5%	4.5%	3.0%	
Connecticut Water	NYSE	CWV	1768	10/12/2018	0.6	1.8%	3.5%	1.0%	6.5%	7.0%	8.0%	5.5%	5.5%	6.5%	3.5%	
Madison Water	NYSE	MWA	1769	10/12/2018	0.85	2.7%	5.0%	0.5%	15.5%	2.0%	0.5%	11.5%	4.5%	22.0%	5.0%	4.5%
S&W Corporation	NYSE	SWW	1771	10/12/2018	0.65	1.9%	2.0%	3.5%	4.0%	4.5%	7.0%	7.5%	2.0%	5.5%	3.5%	4.0%
York Water	NYSE	YORW	1762	10/12/2018	0.8	2.2%	3.5%	6.0%	6.0%	7.0%	11.0%	18.5%	4.5%	5.0%	8.0%	3.0%
Minimum																
Mid Mean																
Mean																
Maximum																

Cost of Equity (Discounted Growth Model)

Unlevered 2.09% mean Cost of Equity

Growth	Est 0.11	Est 0.15	Est 0.19
	10	15	20
	Yrs	Yrs	Yrs
Revenues	4.83%	2.52%	5.78%
CapEx	6.50%	5.89%	6.67%
Leverage	5.75%	7.44%	9.39%
Dividends	4.00%	4.83%	8.28%
Book Value	5.00%	4.94%	4.22%
Mean	5.02%	5.12%	6.87%
Growth	6.87%	AUS Input	

Cost of Equity Capital Asset Pricing Model (CAPM)

Risk Free Rate	4.97%	Input
Beta	0.73	Input
Risk Premium	1.90%	Input
Market Return	6.87%	Input
Long Term Government Bond (Income Return S&P)	Mean	Input
Cost of Equity	6.87%	AUS Input
Cost of Equity Dividend Growth Model	2.09%	
Dividend Growth	6.87%	
Cost of Equity	8.90%	

Cost of Equity (Capital Asset Pricing Model (CAPM))

Market Return	8.96%
Beta	10.14%
Risk Premium	9.55%
Market Return	9.95%
Long Term Government Bond (Income Return S&P)	Mean
Cost of Equity	6.87%
Dividend Growth	6.87%
Cost of Equity	13.52%

S:\water industry\East Norriton Township\East Norriton\Update Study 4-1-2019\Update 6-18-2019\East Norriton Sanitary Wastewater System Valuation as of 10-29-2018 Created 6-17-2019

**Value Line Investment Surveys
Water Industry
As of Second Quarter 2018 (7-1-2018)**

Company	Exchange	Ticker	Valueline No.	Valueline Issue	Total Return				
					1 year	3 Years	3 years	5 Years	5 years
Input Value Line	Input Value Line	Input Value Line	Input Value Line	Input Value Line	Input Value Line	Input Value Line	Input Value Line	Input Value Line	Input Value Line
							Calculation	Calculation	Calculation
							$=((1+3 \text{ year Total Return})^{1/3})-1$	$=((1+5 \text{ year Total Return})^{1/5})-1$	$=((1+5 \text{ year Total Return})^{1/5})-1$
American States Water	NYSE	AWR	1784	10/12/2018	26.5%	57.2%	16.3%	148.5%	20.0%
American Water	NYSE	AWK	1785	10/12/2018	11.0%	70.0%	19.3%	138.6%	19.0%
Aqua American	NYSE	WTR	1786	10/12/2018	13.8%	49.8%	14.4%	68.7%	11.0%
California Water	NYSE	CWT	1787	10/12/2018	14.5%	107.0%	27.4%	138.6%	19.0%
Connecticut Water	NDQ	CTWS	1788	10/12/2018	19.3%	103.0%	26.6%	144.7%	19.6%
Consolidated Water Company	NDQ	CWCO	1789	10/12/2018	11.0%	28.7%	8.8%	4.9%	1.0%
Middlesex Water	NDQ	MSEX	1790	10/12/2018	26.0%	117.9%	29.6%	160.8%	21.1%
SJW Corporation	NYSE	SJW	1791	10/12/2018	10.0%	110.8%	28.2%	143.8%	19.5%
York Water	NDQ	YORW	1792	10/12/2018	-8.4%	53.6%	15.4%	69.8%	11.2%
Total					13.7%		20.7%		15.7%
Minimum					-8.40%		8.77%		0.96%
wtd Mean									
Mean					13.74%		20.68%		15.71%
Median					13.80%		19.35%		19.00%
Maximum					26.50%		29.64%		21.13%

PENNSYLVANIA PUBLIC UTILITY COMMISSION

Public Meeting held January 17, 2018

Docket Number: M-2018-3006643

BUREAU OF TECHNICAL UTILITY SERVICES

REPORT ON THE QUARTERLY EARNINGS

OF JURISDICTIONAL UTILITIES

FOR THE YEAR ENDED

September 30, 2018

Gladys M. Brown, Chairman
David W. Sweet, Vice Chairman
Norman J. Kennard, Commissioner
Andrew G. Place, Commissioner Statement, Dissenting
John F. Coleman, Jr., Commissioner

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Introduction:

On September 20, 1991, the Commission initiated a rulemaking at L-00910061 pertaining to earnings disclosures by the public utilities subject to its jurisdiction. At that docket, the Commission stated that the submission of accurate, reliable and complete earnings disclosure reports, at regular intervals, is essential to the fulfillment of the broad regulatory oversight responsibilities entrusted to the Commission by the Legislature in the Public Utility Code. The earnings disclosure regulations promulgated by the Commission were adopted October 1, 1992, and published January 23, 1993, at 23 Pa.B. 463. Based upon those regulations, codified at 52 Pa. Code, Chapter 71, a reporting format was developed and distributed to the jurisdictional fixed utilities of Pennsylvania.

All fixed utilities having jurisdictional revenues of \$1,000,000 or more, for a calendar year, are required to file the report by March 31 of each year. Such reports are to be based upon the results of operations for the 12-month period ending December 31 of the prior year. Utilities having more than \$10,000,000 in jurisdictional revenues are also required to file reports for the 12 months ending on March 31, June 30, and September 30 of each year. On November 30, 2004, however, the Pennsylvania General Assembly signed into law Act 183 concerning alternative telecommunications regulation and broadband deployment. As a result of Act 183, the reporting requirements for the PUC jurisdictional telecommunications companies of Pennsylvania have been streamlined at section 3015(e) of the Public Utility Code. A quarterly earnings report is not listed among those reports now required of PUC jurisdictional telecommunications utilities in Pennsylvania and, therefore, this report does not address telephone company earnings.

The reports have been filed for the period ended June 30, 2018.¹ The Finance Staff of the Bureau of Technical Utility Services has reviewed the reports and has prepared this summary report for public release. This report sets forth the achieved return on equity for each company, the last allowed return for that utility, a market return as determined through the analysis of the barometer group data and the most recent returns allowed, per industry, by the Pennsylvania Public Utility Commission and by other regulatory bodies. Where a utility has not filed a report, the reasons for not filing are indicated.

Questions pertaining to the preparation and contents of this Report should be directed to Ms. Erin Laudenslager, Manager - Finance, Bureau of Technical Utility Services, at (717) 705-4364.

¹ GI Utilities, Inc. – Electric Division, Duquesne Light Company, PECO Energy - Electric, Columbia Gas, York Water, SEZ water, and Aqua Pennsylvania have pending rate filings at Docket Nos. R-2017-2640058, R-2018-3000124, R-2018-3000164, R-2018-2647577, R-2018-3000019, R-2018-3000834, and R-2018-3003068 respectively, and filed a letter with the Secretary in place of a report in accordance with 52 Pa. Code § 71.4.

The equity return summaries that follow in Attachment A are, for each quarter;

ACTUAL

1. Based on actual results of operations

and

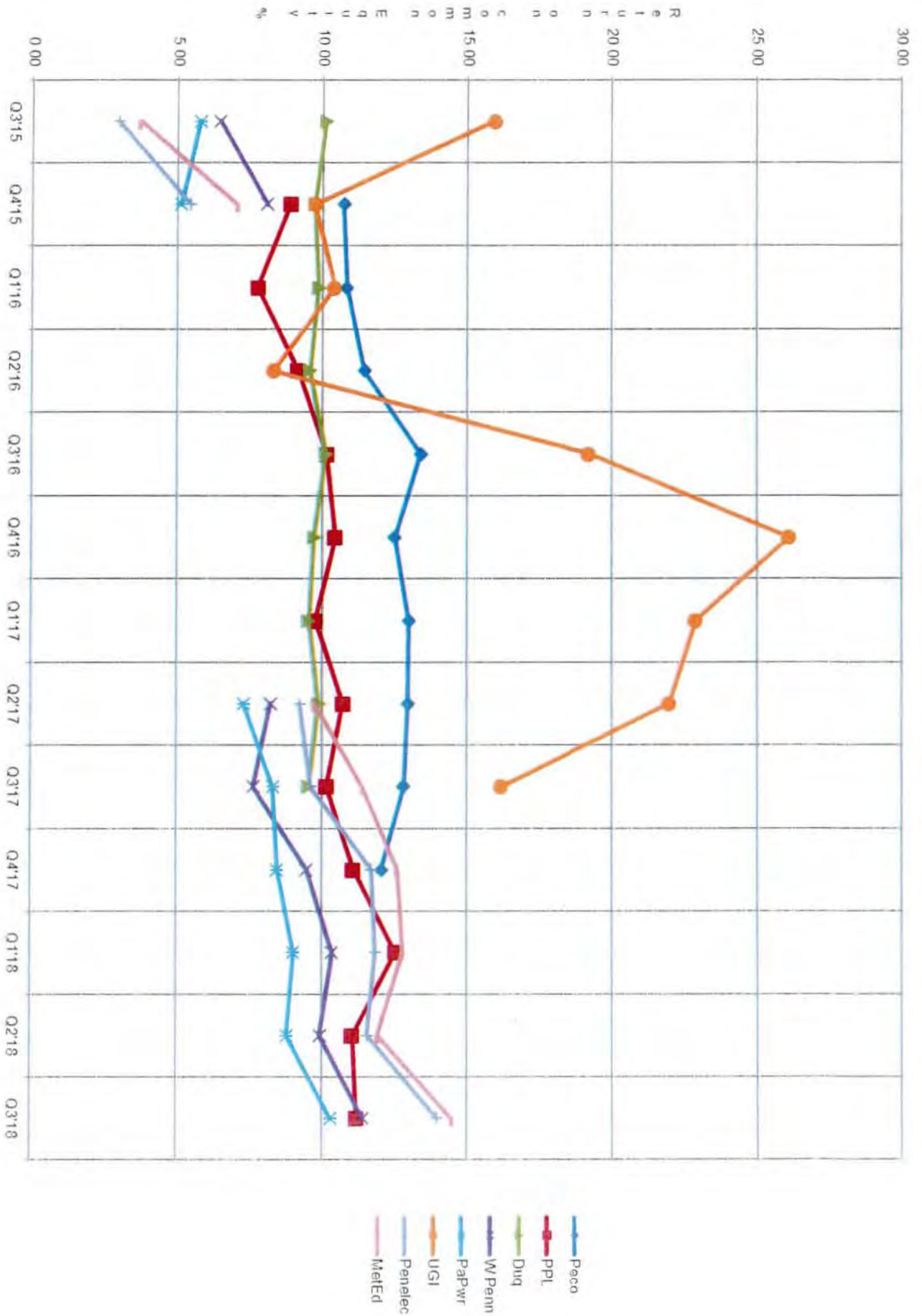
ADJUSTED

2. Based on company proposed pro forma and ratemaking adjustments

**ELECTRIC UTILITIES
EQUITY RETURNS BY QUARTER**

YR END	QTR	PECO		PPL		Duq		W Penn		PaPwr		UGI		Penelec		MetEd	
		ACT	ADJ	ACT	ADJ	ACT	ADJ	ACT	ADJ	ACT	ADJ	ACT	ADJ	ACT	ADJ	ACT	ADJ
2012	4	11.55	11.56	6.02	4.88	10.27	9.24	9.54	9.54	8.41	8.27	14.60	8.98	5.41	7.74	5.39	6.81
2013	1	11.92	11.27	7.56	6.24	10.12	9.74	9.23	9.23	8.89	8.74	12.77	9.84	5.30	7.67	5.01	6.47
	2	11.40	10.74	7.80	7.37			12.34	12.34	8.85	8.70	11.53	10.49	5.86	8.21	5.36	6.79
	3	11.09	10.96	8.67	8.38			9.13	9.13	8.49	8.34	10.74	10.65	-0.77	2.07	-12.43	-10.43
	4	11.97	10.52	10.01	9.79			13.73	13.73	14.49	14.30	14.25	11.99	4.85	2.99	-6.06	-7.87
2014	1	9.97	10.34	10.02	10.04			11.58	9.45	15.28	15.04	13.36	10.25	5.17	3.34	-6.40	-8.13
	2	10.05	10.08	9.50	10.09	9.77	9.29					12.64	9.21				
	3	8.93	9.25	10.07	9.99	9.97	9.48					8.76	9.22				
	4	8.23	9.58			9.77	9.40					9.01	10.00				
2015	1					10.08	9.65					10.88	10.39				
	2					9.80	9.42					13.57	9.49				
	3					10.11	9.73	6.45	6.45	5.77	5.77	15.93	7.57	2.94	2.94	3.69	3.69
	4	10.74	8.84	8.89	8.48	9.73	9.36	8.09	8.09	5.13	5.13	9.74	9.21	5.45	5.45	7.04	7.04
2016	1	10.86	9.74	7.75	6.94	9.87	9.89					10.41	8.69				
	2	11.46	10.15	9.15	8.51	9.57	9.47					8.29	8.10				
	3	13.42	11.44	10.15	9.59	10.12	9.46					19.18	6.99				
	4	12.52	10.65	10.45	10.29	9.71	9.01					26.07	7.30				
2017	1	13.01	11.40	9.76	8.49	9.53	8.99					22.86	6.81				
	2	12.98	11.40	10.71	9.70	9.86	9.24	8.23	7.38	7.32	7.97	21.96	6.74	9.23	9.20	9.74	9.35
	3	12.84	10.52	10.15	9.30	9.53	9.23	7.63	7.24	8.32	9.08	16.13	5.22	9.61	9.50	11.37	10.97
	4	12.07	9.11	11.07	10.63			9.47	9.12	8.46	8.19			11.70	10.93	12.58	11.67
2018	1			12.53	11.36			10.35	9.08	9.03	8.08			11.84	9.93	12.77	11.38
	2			11.05	9.49			9.92	8.52	8.79	7.57			11.56	9.39	11.90	10.26
	3			11.19	9.83			11.41	6.74	10.30	5.80			13.97	8.44	14.46	9.62

Major Pennsylvania Electric Utilities - Actual Equity Returns by Quarter



**GAS UTILITIES
EQUITY RETURNS BY QUARTER**

QTR	Columbia		Peoples Natural		PECO		UGI South		Peoples- Equitable		NFG		UGI North		Peoples Gas		
	END	ACT	ADJ	ACT	ADJ	ACT	ADJ	ACT	ADJ	ACT	ADJ	ACT	ADJ	ACT	ADJ	ACT	ADJ
2012	4			11.24	9.57	12.42	15.10	13.68	9.44	7.27	8.05	15.11	10.17	13.31	10.63	5.05	6.94
2013	1			12.49	9.89	14.63	15.13	14.65	10.27	12.42	8.40	19.33	10.25	13.28	10.58		
	2	10.85	7.15	16.59	8.35	14.43	14.40	13.02	10.21	10.40	8.92	20.18	10.25	10.98	10.27		
	3	9.36	9.86	17.39	8.72	14.14	14.01	12.60	9.38	9.84	9.48	19.61	10.72	10.59	10.76		
	4	10.60	10.78	16.33	10.02	14.35	13.97	16.08	9.20	10.52	9.76	20.51	10.07	13.41	10.49	7.21	12.23
2014	1			14.68	9.94	15.23	13.52	16.81	8.35	12.00	8.73	23.11	9.78	16.67	10.06	12.19	11.87
	2			13.05	9.78	15.32	13.24	16.71	8.39	13.54	8.49	22.97	12.00	15.30	10.90	14.06	12.32
	3			13.43	9.16	15.45	13.21	16.63	8.64	14.41	9.15	21.36	11.03	13.77	10.15	15.07	12.62
	4	9.71	9.97	11.85	7.89	13.86	12.59	15.00	7.93	14.52	12.46	20.40	10.79	15.64	9.82	16.91	11.83
2015	1			14.22	7.90	14.60	13.01	15.76	7.87	15.36	12.14	20.17	10.31	15.57	9.52	16.36	11.23
	2			14.37	8.88	13.89	12.32	14.07	7.62	14.08	11.26	18.82	10.39	13.76	8.90	16.15	12.90
	3			13.55	8.14	13.29	11.77	15.67	6.51	11.30	10.87	16.41	10.27	13.16	8.32	15.69	12.58
	4	9.75	9.73	8.80	9.83	12.50	12.70			10.60	10.00	15.01	10.59	9.17	7.25	12.71	12.14
2016	1			7.01	10.02	10.73	13.58			8.98	10.20	12.60	10.97	7.85	8.85	8.54	10.48
	2			6.24	9.99	11.55	13.85			8.29	10.40	12.31	11.08	9.41	8.37	9.20	10.43
	3			6.93	9.34	12.09	14.40			13.05	10.82	13.00	10.34	6.47	8.81	9.07	12.02
	4	8.90	9.26	10.11	11.03	11.39	12.37			16.42	11.07	14.18	9.58			12.47	11.87
2017	1	10.52	10.17	9.96	9.27	11.45	12.55	21.08	10.09	15.85	10.58	12.84	9.26			11.82	12.34
	2	9.15	9.81	9.41	9.71	10.87	12.17	19.16	9.44	15.66	10.30	13.33	10.53			11.89	13.47
	3	8.15	8.77	6.69	6.40	11.26	10.92	13.34	9.03	12.59	9.85	10.92	10.00			12.04	13.36
	4	7.76	8.48	9.66	7.27	11.48	9.83	11.06	8.62	11.28	9.23	11.58	10.56			12.65	11.79
2018	1			11.42	7.00	12.65	9.77	12.82	7.90	12.68	8.22	14.40	10.20	16.95	7.83	14.02	10.17
	2			11.03	6.80	12.66	9.05	16.75	6.80	11.81	9.57	12.06	9.89	17.68	8.02	12.78	10.15
	3			10.21	7.43	12.54	8.36	18.69	8.04	10.99	9.44	12.52	10.12	20.60	9.16	13.03	10.20