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WITNESS: Prefiled Testimony of John Starling, Appearing On Behalf of
the Staff of the Florida Public Service Commission

DATE FILED: February 26, 1996

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FPSC RECORDS/REPORTING

PREFILED TESTIMONY OF JOHN STARLING

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Q. What is your name and business address?

A. My name is John Starling and my business address is 2540 Shumard Oak Boulevard, Tallahassee, FL 32399.

Q. By whom are you employed and in what capacity?

A. I am employed by the Florida Public Service Commission (FPSC) as an Engineer in the Division of Water and Wastewater.

Q. What is your educational background and work experience?

A. In December, 1985, I received a Bachelor of Science Degree in Electrical Engineering from the University of Florida. I worked at Eglin Air Force Base in Fort Walton Beach, Florida from January, 1986 until May, 1990. I was responsible for ensuring that specific radar systems were operating within the required parameters. Since May, 1990, I have worked as an engineer for the FPSC in the Division of Water and Wastewater. I am responsible for reviewing and analyzing engineering issues in utility rate applications, customer complaints and service availability applications and preparing recommendations to the Commission.

Q. Have you ever testified before the FPSC?

A. No.

Q. What is the purpose of your testimony in this proceeding?

A. I am presenting information which demonstrates the impact of different water treatment processes on capital costs and operation and maintenance (O&M) expenses.

Q. What types of water treatment did you review?

A. I evaluated the treatment costs for five different types of treatment:

1 reverse osmosis (RO), lime softening (LS), iron filtration, aeration and/or
2 storage, and simple chlorination. Southern States Utilities, Inc. (SSU) has
3 proposed that a rate for RO treatment plants which differs from what it calls
4 conventional treatment be implemented. I agree that cost differences exist
5 between RO and other treatment types. I also believe, however, that cost
6 differences exist among the other types of water treatment systems. For
7 example, it also costs more to treat the water using lime softening than it
8 does to simply pump and then chlorinate water.

9 Q. Briefly describe reverse osmosis treatment.

10 A. Reverse osmosis is a water treatment process in which raw water is
11 forced through a permeable membrane under high pressure. The membrane is a
12 physical barrier that permits the flow of water through the membrane but acts
13 as a barrier to hardness ions, dissolved organics, chlorides and other
14 contaminants.

15 Q. Briefly describe lime softening treatment.

16 A. Lime softening is a treatment process used to reduce the hardness of
17 water caused by the presence of calcium and magnesium compounds in solution.
18 The hardness is removed by adjusting the pH to precipitate hardness out of
19 solution. The water is then filtered, disinfected and released to the
20 distribution system.

21 Q. Briefly describe iron filtration treatment.

22 A. Iron filtration is a treatment process in which raw water passes through
23 a bed of manganese greensand. The greensand is used to remove iron and
24 manganese as well as tastes and odors from water. SSU's iron filtration
25 plants (except for Fox Run which has a storage tank) pump the water directly

1 | from the well through the iron filters and out to the distribution system.

2 | Other than hydropneumatic tanks, there is no storage at these plants.

3 | Q. Briefly describe aeration treatment.

4 | A. Aeration is a treatment process typically used to remove hydrogen
5 | sulfide from water. The water may either cascade over trays or have air
6 | forced through it which transfers hydrogen sulfide from the water into the
7 | air. Plants which aerate water also have storage tanks and pumping
8 | facilities. The aerator is usually located on top of the storage tank. For
9 | purposes of my analysis, plants which do not aerate the water but have storage
10 | are included in this category. Marion Oaks is an example of a water plant
11 | which has storage but does not aerate the water.

12 | Q. Briefly describe chlorination treatment.

13 | A. Chlorination is a treatment process that disinfects the water and
14 | destroys bacteria and viruses which may be present in raw water. All public
15 | water systems in Florida are required to disinfect the water. Each of the
16 | previously mentioned treatment types also disinfect the water after treatment.

17 | Q. What is the major factor which dictates the type of treatment required
18 | for a raw water supply?

19 | A. The raw water quality is the main factor which dictates the type of
20 | treatment. Items affecting water quality include chloride levels, iron levels
21 | and calcium levels.

22 | Q. How many RO, LS, iron filtration, aeration and/or storage, and
23 | chlorination only water treatment plants has SSU included in its application?

24 | A. SSU's application includes 96 service areas. The water treatment plants
25 | include two RO, four LS, seven iron filtration, thirty-five aeration and/or

1 A. Cost differences were analyzed using a hypothetical utility. The
2 capital costs and expenses of this hypothetical system were estimated for each
3 treatment type. Exhibit JMS-2 summarizes the estimated capital costs for each
4 type of treatment. Exhibit JMS-3 summarizes the estimated expenses for each
5 type of treatment.

6 Q. Please describe the hypothetical system.

7 A. The assumptions underlying the hypothetical system include a service
8 area which will serve 500 residential connections. The average residential
9 consumption is assumed to be 350 gpd per connection, resulting in an average
10 daily demand of 175,000 gpd. The maximum daily demand is assumed to be two
11 times the average daily demand or 350,000 gpd, requiring a water treatment
12 plant capacity of 350,000 gpd. The hypothetical treatment plant is not sized
13 to provide fire flow. The utility site is located on four acres of land. The
14 raw water source is provided by two wells located on the four acre site. The
15 treatment plant will also be located on this land. The only contributed
16 facilities are the transmission and distribution lines, services and meters.

17 Q. Is the capacity consideration different for the iron filtration plant?

18 A. Yes. A 792,000 gpd capacity for the iron filtration plant is
19 appropriate. Since SSU's plants (except for Fox Run) do not have storage, the
20 iron filters must be sized to meet peak demands. A peak demand of 1.1 gpm/ERC
21 results in a required plant capacity of 550 gpm or 792,000 gpd for the iron
22 filtration system.

23 Q. Please describe the information provided in Exhibit JMS-2, Hypothetical
24 Capital Costs.

25 A. Page one is a summary of the detailed original cost information provided

1 | on pages two and three of the exhibit. Page one provides by NARUC account the
2 | plant in service for each type of treatment.

3 | Q. What is the basis for the estimates of capital costs used in your
4 | analysis?

5 | A. Estimates of the capital costs which would be common to all or most of
6 | the hypothetical treatment types (wells, meters, auxiliary generator, storage
7 | tanks, chlorination equipment, etc.) are based on knowledge of equipment costs
8 | which I have acquired during my six years at the FPSC as well as consultations
9 | with other members of staff.

10 | Q. What are the unit costs you have calculated for treatment type?

11 | A. I have concluded that a reasonable unit cost for a LS treatment plant
12 | is \$1.07 per gallon, a reasonable unit cost for a RO plant is \$4.00 per
13 | gallon, and a reasonable unit cost for an iron filtration plant is \$0.28 per
14 | gallon.

15 | Q. How were the unit costs for the RO, LS, and iron filtration plants
16 | determined?

17 | A. I reviewed the original costs of eleven RO, nine LS, and seven iron
18 | filtration treatment plants which are or were under the Commission's
19 | jurisdiction. These plants were constructed between 1973 and 1993. The plant
20 | costs were updated to January, 1995 using the Handy-Whitman index which can
21 | be used to update the cost of water treatment facilities. The Handy-Whitman
22 | index number is a percentage ratio between the cost of an item at any stated
23 | time and its cost at a base period as follows: $\text{Index \#} = (\text{cost at stated}$
24 | $\text{time/cost at base period}) * 100\%$. The Handy-Whitman index has been used by
25 | the FPSC to estimate the original cost of water treatment facilities.

1 | Q. Did these plant costs include engineering and overhead?

2 | A. Yes, these costs were included whenever possible. If engineering and
3 | overhead costs were not available, I estimated they were 15% of the plant's
4 | direct cost.

5 | Q. How were the original costs of the iron filtration, lime softening, and
6 | reverse osmosis treatment plants calculated?

7 | A. As stated earlier, the capacity of hypothetical RO and LS treatment
8 | plants are 350,000 gpd. Multiplying 350,000 by \$1.07 gives the hypothetical
9 | LS plant's original cost of \$375,000. Similarly, the RO plant's original cost
10 | is \$1,400,000. As discussed earlier in my testimony, the iron filtration
11 | plant must provide flows to meet peak demands and its capacity is 792,000 gpd.
12 | Multiplying 792,000 by \$0.28 yields an original cost of \$221,760 for the iron
13 | filter units.

14 | Q. Is there any other factor besides the treatment unit which will affect
15 | the cost of an RO plant?

16 | A. Yes. RO plant concentrate (brine or reject) disposal capital costs can
17 | be significant. There are several methods utilized for disposing of RO reject
18 | water: deep well injection, surface water discharge, discharge to a
19 | wastewater treatment plant and percolation ponds.

20 | Q. Did you include the costs of concentrate disposal in your RO plant
21 | costs?

22 | A. Yes. If the cost information was available, I included the capital
23 | costs for RO disposal in my review of the original plant costs.

24 | Q. Please describe the information provided in Exhibit JMS-3, Hypothetical
25 | System Expenses.

1 | A. Page one is a summary of the O&M expenses for the different types of
2 | treatment. Page two provides more detailed information about how the expenses
3 | on page one were calculated. The estimate of expenses which are common to all
4 | of the treatment types (receptionist/bookkeeping, officer salaries, office
5 | supplies, contract services, etc.) is based upon my knowledge of the expected
6 | costs for these types of expenses and consultations with other members of
7 | staff.

8 | Q. How were the chemical expenses for each type of treatment determined?

9 | A. For each type of treatment, I gathered chemical expense and gallons
10 | pumped data over a one year period. Most of the chemical expense and gallons
11 | pumped data comes from annual reports which have been filed with the FPSC, but
12 | some data comes from recent rate cases. The chemical unit costs which I used
13 | are simply an average of all the data which was collected for each type of
14 | treatment. The average unit chemical costs are as follows: chlorination is
15 | 2.8 cents per 1000 gallons, aeration and/or storage is 2.7 cents per 1000
16 | gallons, iron filtration is 8.8 cents per gallon, LS is 21.4 cents per 1000
17 | gallons, and RO is 47.1 cents per 1000 gallons. For the hypothetical system,
18 | I estimated the chemical expense by multiplying the chemical unit cost by the
19 | total gallons of water treated in a year, 175,000 gpd for 365 days. This
20 | results in an annual chemical expense of \$1,789 for simple chlorination,
21 | \$1,731 for aeration/storage, \$5,655 for iron filtration, \$13,644 for lime
22 | softening, and \$30,063 for reverse osmosis.

23 | Q. How were the power expenses for each type of treatment determined?

24 | A. For each type of treatment, I gathered purchased power expense and
25 | gallons pumped data over a one year period. Most of the purchased power

1 | expense and gallons pumped data comes from annual reports which have been
2 | filed with the FPSC, but some data comes from recent rate cases. The power
3 | unit costs which I used are simply an average of all the data which was
4 | collected for each type of treatment. The average unit purchased power costs
5 | are as follows: chlorination is 17.6 cents per 1000 gallons, aeration and/or
6 | storage is 12.7 cents per 1000 gallons, iron filtration is 23.0 cents per 1000
7 | gallons, LS is 22.2 cents per 1000 gallons, and RO is 95.8 cents per 1000
8 | gallons. This results in annual purchased power expense of \$11,268 for simple
9 | chlorination, \$8,104 for aeration/storage, \$14,716 for iron filtration, and
10 | \$14,214 for lime softening and \$61,176 for reverse osmosis.

11 | Q. How was the \$33,000 expense for the RO and LS plant operator estimated?

12 | A. This information is based upon the Hewitt study which was an exhibit
13 | (DGL-3) to SSU witness Dale Lock's prefilled direct testimony. The \$33,000
14 | salary for an Operator III is provided on page 7 of this exhibit.

15 | Q. How did you estimate the yearly expense for materials and supplies for
16 | the treatment plant?

17 | A. I assumed that the expense for materials and supplies for RO and LS
18 | would be higher than it would be for other treatment types since more
19 | equipment may need replacing. I believe that the amounts are reasonable
20 | estimates for the hypothetical utility.

21 | Q. What was the difference in cost for each of the different types of
22 | treatment?

23 | A. Using the plant and expense information from Exhibits JMS-2 and JMS-3,
24 | Mr. Casey calculated the following revenue requirements for each type of
25 | treatment: \$140,093 for simple chlorination, \$193,780 for iron filtration,

1 | \$219,204 for aeration and/or storage, \$350,712 for LS, and \$687,615 for RO.
2 | If simple chlorination is assumed to be the base (or 1), the following cost
3 | factors for the different types of treatment result: iron filtration is 1.38
4 | times the cost of simple chlorination, aeration and/or storage is 1.56 times
5 | the cost of simple chlorination, LS is 2.50 times the cost of simple
6 | chlorination and RO is 4.90 times the cost of simple chlorination.
7 | Q. Please describe the appropriate limitations of your analysis.
8 | A. My testimony is not meant to imply that the cost factors which I have
9 | presented are the only ones which the Commission should consider. In fact,
10 | treatment cost is just one of many factors which affects a utility's cost of
11 | providing service.
12 | Q. Would the capital costs of similarly sized plants using the same
13 | treatment differ?
14 | A. Yes. There are many variables involved in the design and construction
15 | of a water treatment plant. Therefore, the capital costs of similarly sized
16 | plants which utilize the same treatment process may differ. For the purpose
17 | of comparing costs of different types of treatments, I believe that what I
18 | have presented is a reasonable estimate of those differences.
19 | Q. Is there anything you would like to add?
20 | A. No.
21 | Q. Does this conclude your testimony?
22 | A. Yes.
23 |
24 |
25 |

SSU WATER PLANTS AND TYPES OF TREATMENT

Water System	Treatment Type	Water System	Treatment Type
Beecher's Point	Purchased Water	Amelia Island	Aeration/Storage
Daetwyler Shores	Purchased Water	Apple Valley	Aeration/Storage
Deep Creek	Purchased Water	Beacon Hills	Aeration/Storage
Enterprise	Purchased Water	Buenaventura Lakes	Aeration/Storage
Golden Terrace	Purchased Water	Chuluota	Aeration/Storage
Holiday Haven	Purchased Water	Citrus Springs	Aeration/Storage
Jungle Den	Purchased Water	Deltona	Aeration/Storage
Kingswood	Purchased Water	Dol Ray Manor	Aeration/Storage
Lake Conway Park	Purchased Water	Druid Hills	Aeration/Storage
Oakwood	Purchased Water	Fern Park	Aeration/Storage
Palm Valley	Purchased Water	Fountains	Aeration/Storage
Westmont	Purchased Water	Hermits Cove	Aeration/Storage
Lehigh	Lime Softening	Interlachen Lake Est./Park Manor	Aeration/Storage
Marco Shores	Lime Softening	Keystone Heights	Aeration/Storage
Sugar Mill	Lime Softening	Lake Ajay Estates	Aeration/Storage
Burnt Store	Reverse Osmosis	Lake Brantley	Aeration/Storage
Marco Island	RO & LS	Lake Harriet Estates	Aeration/Storage
Apache Shores	Iron Filtration	Leisure Lakes	Aeration/Storage
Crystal River Highlands	Iron Filtration	Marion Oaks	Aeration/Storage
Fox Run	Iron Filtration	Meredith Manor	Aeration/Storage
Gospel Island Estates	Iron Filtration	Palm Port	Aeration/Storage
Lakeside	Iron Filtration	Pine Ridge Estates	Aeration/Storage
Palms Mobile Home Park	Iron Filtration	Piney Woods	Aeration/Storage
Point O' Woods	Iron Filtration	Remington Forest	Aeration/Storage

SSU WATER PLANTS AND TYPES OF TREATMENT

Water System	Treatment Type	Water System	Treatment Type
River Grove	Aeration/Storage	Keystone Club Estates	Chlorination
River Park	Aeration/Storage	Lakeview Villas	Chlorination
Silver Lake Est./Western Shores	Aeration/Storage	Lellani Heights	Chlorination
Silver Lake Oaks	Aeration/Storage	Morningview	Chlorination
St. John's Highlands	Aeration/Storage	Oak Forest	Chlorination
Sugar Mill Woods	Aeration/Storage	Pallsades Country Club	Chlorination
Sunny Hills	Aeration/Storage	Palm Terrace	Chlorination
Sunshine Parkway	Aeration/Storage	Picciola Island	Chlorination
University Shores	Aeration/Storage	Pine Ridge	Chlorination
Welaka/Saratoga Harbour	Aeration/Storage	Pomona Park	Chlorination
Woodmere	Aeration/Storage	Postmaster Village	Chlorination
Bay Lake Estates	Chlorination	Quail Ridge	Chlorination
Carlton Village	Chlorination	Rolling Green/Rosemont	Chlorination
Citrus Park	Chlorination	Salt Springs	Chlorination
E. Lk. Harris Est./Friendly Ctr.	Chlorination	Samira Villas	Chlorination
Fern Terrace	Chlorination	Skycrest	Chlorination
Fisherman's Haven	Chlorination	Spring Gardens	Chlorination
Geneva Lake Estates	Chlorination	Stone Mountain	Chlorination
Grand Terrace	Chlorination	Tropical Park	Chlorination
Harmony Homes	Chlorination	Valencia Terrace	Chlorination
Hobby Hills	Chlorination	Venetian Village	Chlorination
Holiday Heights	Chlorination	Windsong	Chlorination
Imperial Terrace	Chlorination	Wootens	Chlorination
Intercession City	Chlorination	Zephyr Shores	Chlorination

HYPOTHETICAL CAPITAL COSTS – SUMMARY

ACCT.	DESCRIPTION	SIMPLE CHLORINATION	AERATION/ STORAGE	IRON FILTRATION	LIME SOFTENING	REVERSE OSMOSIS
301	INTANGIBLE PLANT	\$1,873	\$1,873	\$1,873	\$1,873	\$2,873
	SOURCE OF SUPPLY & PUMPING					
303.2	Land & Land Rights	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000
304.2	Structures & Improvements	\$6,575	\$7,646	\$7,646	\$7,646	\$7,646
305.2	Collect. & Impound. Reservoirs	\$0	\$0	\$0	\$0	\$0
306.2	Lake, River, & Other	\$0	\$0	\$0	\$0	\$0
307.2	Wells & Springs	\$22,426	\$22,426	\$22,426	\$22,426	\$22,426
308.2	Infiltration Galleries	\$0	\$0	\$0	\$0	\$0
309.2	Supply Mains	\$10,765	\$10,765	\$10,765	\$10,765	\$10,765
310.2	Power Generation Equipment	\$17,460	\$17,460	\$17,460	\$17,460	\$17,460
311.2	Pumping Equipment	\$9,076	\$49,076	\$9,076	\$49,076	\$49,076
339.2	Other Plant & Miscellaneous	\$0	\$0	\$0	\$0	\$0
	WATER TREATMENT PLANT					
303.3	Land & Land Rights	\$0	\$0	\$0	\$0	\$0
304.3	Structures & Improvements	\$12,400	\$16,000	\$12,400	\$16,000	\$16,000
320.3	Treatment Equipment	\$0	\$0	\$221,760	\$375,000	\$962,500
320.3	Chlorination Equipment	\$6,860	\$6,860	\$6,860	\$6,860	\$6,860
320.3	Permeators					\$437,500
339.3	Other Plant & Miscellaneous	\$0	\$0	\$0	\$0	\$0
	TRANSMISSION & DISTRIBUTION					
303.4	Land & Land Rights	\$0	\$0	\$0	\$0	\$0
304.4	Structures & Improvements	\$0	\$0	\$0	\$0	\$0
330.4	Distribution Reservoirs	\$13,950	\$410,000	\$13,950	\$410,000	\$410,000
331.4	Transmission & Distribution Mains	\$225,000	\$225,000	\$225,000	\$225,000	\$225,000
333.4	Services	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000
334.4	Meters & Meter Installations	\$50,000	\$50,000	\$50,000	\$50,000	\$50,000
335.4	Hydrants	\$0	\$0	\$0	\$0	\$0
339.4	Other Plant & Miscellaneous	\$0	\$0	\$0	\$0	\$0
	GENERAL PLANT					
	General Plant	\$0	\$0	\$0	\$0	\$0
	TOTAL PLANT IN SERVICE	\$421,385	\$862,106	\$644,216	\$1,237,106	\$2,263,106

HYPOTHETICAL CAPITAL COSTS – DETAIL

ACCT.	DESCRIPTION	SIMPLE CHLORINATION	AERATION/ STORAGE	IRON FILTRATION	LIME SOFTENING	REVERSE OSMOSIS
301	INTANGIBLE PLANT					
	-WMD Well Permit (2 wells @ 150)	\$300	\$300	\$300	\$300	\$300
	-Permit Appn. Fee for R.O. Discharge	\$0	\$0	\$0	\$0	\$1,000
	-Occupational License	\$50	\$50	\$50	\$50	\$50
	-DEP Permit Fee	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000
	-Bd. of County Comm. (Co. permit)	\$300	\$300	\$300	\$300	\$300
	-BPR (Water License)	\$100	\$100	\$100	\$100	\$100
	-Incorporation Fees	\$123	\$123	\$123	\$123	\$123
	TOTAL – INTANGIBLE PLANT	\$1,873	\$1,873	\$1,873	\$1,873	\$2,873
303.2	LAND & LAND RIGHTS					
	Land – Source of Supply					
	- \$5,000/acre * 4 acres	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000
	Land – Water Treatment Plant					
	- located on well setback	\$0	\$0	\$0	\$0	\$0
	TOTAL – LAND & LAND RIGHTS	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000
304.2	STRUCT. & IMPROV. – SOURCE					
	- Fencing @ \$5.95/ft * 500' or 680'	\$2,975	\$4,046	\$4,046	\$4,046	\$4,046
	Pump House & Storage					
	- Pump House, 180 sq.ft. @ \$20/sq. ft.	\$3,600	\$3,600	\$3,600	\$3,600	\$3,600
	TOTAL – SOURCE STRUCT. & IMPROV.	\$6,575	\$7,646	\$7,646	\$7,646	\$7,646
307.2	WELLS & SPRINGS					
	Wells, Casings, Appurtenances					
	- 400', 6" casing @ \$12/ft, * 2 wells	\$9,600	\$9,600	\$9,600	\$9,600	\$9,600
	- 6% sales tax	\$576	\$576	\$576	\$576	\$576
	- 600' drilling @ \$9/ft, * 2 wells	\$10,800	\$10,800	\$10,800	\$10,800	\$10,800
	- Pump Test @ \$600/well, * 2 wells	\$1,200	\$1,200	\$1,200	\$1,200	\$1,200
	- Survey	\$250	\$250	\$250	\$250	\$250
	TOTAL – WELLS & SPRINGS	\$22,426	\$22,426	\$22,426	\$22,426	\$22,426
309.2	SUPPLY MAINS					
	4" Turbine Master Meter	\$1,185	\$1,185	\$1,185	\$1,185	\$1,185
	Valves, Vaults, and Appurtenances	\$9,580	\$9,580	\$9,580	\$9,580	\$9,580
	TOTAL – SUPPLY MAINS	\$10,765	\$10,765	\$10,765	\$10,765	\$10,765

HYPOTHETICAL CAPITAL COSTS – DETAIL

ACCT.	DESCRIPTION	SIMPLE CHLORINATION	AERATION/ STORAGE	IRON FILTRATION	LIME SOFTENING	REVERSE OSMOSIS
310.2	POWER GENERATION EQUIPMENT Auxiliary Generator (34 kW) with auto transfer switch	\$17,460	\$17,460	\$17,460	\$17,460	\$17,460
311.2	PUMPING EQUIPMENT Well pumps	\$9,076	\$9,076	\$9,076	\$9,076	\$9,076
	High Service pumps	\$0	\$40,000	\$0	\$40,000	\$40,000
	TOTAL – PUMPING EQUIPMENT	\$9,076	\$49,076	\$9,076	\$49,076	\$49,076
304.3	STRUCT. & IMPROV. – WTP –H.S. Pump House	\$0	\$3,600	\$0	\$3,600	\$3,600
	–Chlorine Room, 80 sq.ft. @ \$30/sq. ft.	\$2,400	\$2,400	\$2,400	\$2,400	\$2,400
	–Clearing @ \$2,500/acre	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000
	TOTAL – WTP STRUCT. & IMPROV.	\$12,400	\$16,000	\$12,400	\$16,000	\$16,000
320.3	WATER TREATMENT EQUIPMENT –Chlorination	\$6,860	\$6,860	\$6,860	\$6,860	\$6,860
	–Iron Filtration	\$0	\$0	\$221,760	\$0	\$0
	–Lime Softening	\$0	\$0	\$0	\$375,000	\$0
	–Reverse Osmosis	\$0	\$0	\$0	\$0	\$1,400,000
	TOTAL – WATER TREATMENT PLANT	\$6,860	\$6,860	\$228,620	\$381,860	\$1,406,860
330.4	DISTRIBUTION RESERVOIRS –7,500 gal hydro @1.86/gal	\$13,950	\$0	\$13,950	\$0	\$0
	–300,000 gallons @ \$1.5/gal less \$40,000 for high service pumps	\$0	\$410,000	\$0	\$410,000	\$410,000
	TOTAL – DISTRIBUTION RESERVOIRS	\$13,950	\$410,000	\$13,950	\$410,000	\$410,000
331.4	TRANS. AND DIST. MAINS –40,000 feet of pipe @ \$5.625/ft.	\$225,000	\$225,000	\$225,000	\$225,000	\$225,000
333.4	SERVICES –500 service connection @ \$50/connection	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000
334.4	METERS AND METER INSTALLATIONS –500 meters @ \$100/meter	\$50,000	\$50,000	\$50,000	\$50,000	\$50,000

HYPOTHETICAL SYSTEM EXPENSES – SUMMARY

ACCT.	DESCRIPTION	SIMPLE CHLORINATION	AERATION/ STORAGE	IRON FILTRATION	LIME SOFTENING	REVERSE OSMOSIS
601	SALARIES AND WAGES – EMPLOYEES	\$21,154	\$21,154	\$21,154	\$54,154	\$54,154
603	SALARIES AND WAGES – OFFICERS	\$21,653	\$21,653	\$21,653	\$21,653	\$21,653
604	EMPLOYEE PENSIONS AND BENEFITS	\$0	\$0	\$0	\$0	\$0
610	PURCHASED WATER	\$0	\$0	\$0	\$0	\$0
615	PURCHASED POWER	\$11,268	\$8,104	\$14,716	\$14,214	\$61,176
616	FUEL FOR POWER CONSUMPTION	\$0	\$0	\$0	\$0	\$0
618	CHEMICALS	\$1,789	\$1,731	\$5,655	\$13,644	\$30,063
620	MATERIALS & SUPPLIES	\$8,000	\$8,000	\$8,000	\$11,000	\$14,000
630	CONTRACTUAL SERVICES	\$27,750	\$28,913	\$28,913	\$22,613	\$22,613
640	RENTS	\$6,000	\$6,000	\$6,000	\$6,000	\$6,000
650	TRANSPORTATION EQUIPMENT	\$1,305	\$1,305	\$1,305	\$1,305	\$1,305
655	INSURANCE EXPENSE	\$2,107	\$4,311	\$3,169	\$6,186	\$11,316
665	REGULATORY COMMISSION EXPENSE	\$250	\$250	\$250	\$250	\$250
670	BAD DEBT EXPENSE	\$0	\$0	\$0	\$0	\$0
675	MISCELLANEOUS EXPENSES	\$665	\$665	\$665	\$665	\$665
	TOTAL	\$101,940	\$102,085	\$111,480	\$151,683	\$223,194
408	TAXES OTHER THAN INCOME	\$10,276	\$11,819	\$11,020	\$19,579	\$23,170

HYPOTHETICAL SYSTEM EXPENSES – DETAIL

ACCT.	DESCRIPTION	SIMPLE CHLORINATION	AERATION/ STORAGE	IRON FILTRATION	LIME SOFTENING	REVERSE OSMOSIS
601	SALARIES AND WAGES – EMPLOYEES 1 F/T Recept., Bookkeeper, Billing (40 hrs/week @ \$10.17/hour = \$406.80/wk)	\$21,154	\$21,154	\$21,154	\$21,154	\$21,154
	1 F/T Operator III (LS & RO)	\$0	\$0	\$0	\$33,000	\$33,000
603	SALARIES AND WAGES – OFFICERS Owner/Manager, 20 hrs/week @ \$20.82/hr = \$416.40/wk	\$21,653	\$21,653	\$21,653	\$21,653	\$21,653
615	PURCHASED POWER (1)	\$11,268	\$8,104	\$14,716	\$14,214	\$61,176
618	CHEMICALS (1)	\$1,789	\$1,731	\$5,655	\$13,644	\$30,063
620	MATERIALS & SUPPLIES – For the T&D system and the wtp – Office Supplies (\$1/customer/mo = \$500/month)	\$2,000 \$6,000	\$2,000 \$6,000	\$2,000 \$6,000	\$5,000 \$6,000	\$8,000 \$6,000
	TOTAL – MATERIALS & SUPPLIES	\$8,000	\$8,000	\$8,000	\$11,000	\$14,000
630	CONTRACTUAL SERVICES– ACCT. – Ann. Rpt., Income Tax, Books, Index/PT (\$350.00/month)	\$4,200	\$4,200	\$4,200	\$4,200	\$4,200
630	CONTRACTUAL SERVICES– OTHER – Contract Operator (6 hrs/week, \$525.00/month) – Assistant @ 25 hr/wk @ \$10/hr, \$1,000/month – Meter Reader, 500 mtrs/mo @ \$0.35/mtr, \$175.00/month – Mowing & Grounds Keeping – Testing (2) – Tank painting: Hydropneumatic tank is \$2,500 and ground storage tank is \$8,315 once every five years.	\$6,300 \$12,000 \$2,100 \$650 \$2,000 \$500	\$6,300 \$12,000 \$2,100 \$650 \$2,000 \$1,663	\$6,300 \$12,000 \$2,100 \$650 \$2,000 \$1,663	\$0 \$12,000 \$2,100 \$650 \$2,000 \$1,663	\$0 \$12,000 \$2,100 \$650 \$2,000 \$1,663
	TOTAL – CONTRACT SERVICES	\$27,750	\$28,913	\$28,913	\$22,613	\$22,613
641	RENTAL OF BUILDING/PROPERTY – Office of 300 square feet @ \$500.00/month	\$6,000	\$6,000	\$6,000	\$6,000	\$6,000
650	TRANSPORTATION EXPENSE 4,500 mi/yr @ \$0.29/mi	\$1,305	\$1,305	\$1,305	\$1,305	\$1,305
657	INSURANCE– GENERAL LIABILITY (3)	\$2,107	\$4,311	\$3,169	\$6,186	\$11,316
666	REG. COMM. EXP– RATE CASE	\$250	\$250	\$250	\$250	\$250
675	MISCELLANEOUS EXPENSES – Telephone @ \$45/mo – AWWA membership dues	\$540 \$125	\$540 \$125	\$540 \$125	\$540 \$125	\$540 \$125
	TOTAL – MISCELLANEOUS EXPENSES	\$665	\$665	\$665	\$665	\$665
408	TAXES OTHER THAN INCOME – Property Taxes & Personal Property (4) – Payroll Taxes Social Security (6.2%) Medicare (1.45%) State Unemployment (2.7% of first \$7K) Federal Unemployment (6.2% of first \$7K) Workers Comp (10% of Annual salaries)	\$1,475 \$2,654 \$621 \$378 \$868 \$4,281	\$3,017 \$2,654 \$621 \$378 \$868 \$4,281	\$2,219 \$2,654 \$621 \$378 \$868 \$4,281	\$4,330 \$4,700 \$1,099 \$567 \$1,302 \$7,581	\$7,921 \$4,700 \$1,099 \$567 \$1,302 \$7,581
	TOTAL – TAXES OTHER THAN INCOME	\$10,276	\$11,819	\$11,020	\$19,579	\$23,170

ASSUMPTIONS:

- 500 Connections and average daily flow of 175,000 gpd.
- Number of employees increases w/ LS & RO since add a full-time operator.
- Contractual Accountant maintains books, does annual reports, taxes, etc.

NOTES

- Costs based on Average Daily Flow of 175,000 gpd.
- Testing costs include primary & secondary standards monitoring.
- General Liability insured based on 0.5% of PIS.
- Property Taxes & Personal Property based on 0.35% of PIS.

WATER TREATMENT PLANT CAPITAL COSTS

System

Useppa Island	Aquarina	Burnt Store	Burnt Store	Marco Island	Plantation (Martin)	Sailfish Point	Ocean City	Palm Coast	Gulf
RO	RO	RO	RO	RO	RO	RO	RO	RO	RO
1978&1990	1984	1978	1994	1992&1995	11/2/77	'81, '83, '92	'73 & 85	1992	1991
\$175,111	\$221,198	\$358,865	\$3,728,326	\$16,593,348	\$201,268	\$783,995	\$161,006	\$7,182,056	\$1,895,225
\$66,607	\$85,432	\$33,982	\$444,445	\$2,507,491	\$45,524	\$1,074,092	\$59,697	\$3,103,901	\$1,895,225
113,400	120,000	160,000	480,000	5,000,000	200,000	350,000	89,560	3,000,000	500,000

Trended WTP Cost (\$/gal)

\$2.13 \$3.22 \$4.48 \$8.69 \$3.82 \$2.42 \$5.31 \$2.46 \$3.43 \$4.33

Type of Treatment	Average Cost (\$/gal)	
RO	\$3.99	Use \$4.00/gallon
LS	\$1.07	Use \$1.07/gallon
Iron Filters	\$0.28	Use \$0.28/gallon

WATER TREATMENT PLANT CAPITAL COSTS

System	Vineyards	Plantation (Flagler)	Ferncrest	FCWC Bareft. Bay	South Broward	Sugar Mill	Indian River Ut.	FCWC-Lee Gr. Meadows	Gulf
Treatment Type	RO	LS	LS	LS	LS	LS	LS	LS	LS
Year Constructed	1987	Nov, 1986	12/73	1980	1986-1989	4/80	1986	1980&1985	1981
WTP Equipment	\$138,757	\$700,519	\$335,005	\$873,706	\$1,421,637	\$397,349	\$155,042	\$9,009,028	\$526,809
Structures & Imp.	\$16,206	\$152,714	\$0	\$0	\$533,864	\$0	\$22,044	\$0	
WTP Capacity	50,000	750,000	1,000,000	1,000,000	2,000,000	504,000	288,000	9,000,000	1,000,000
Trended WTP Cost (\$/gal)	\$3.58	\$1.34	\$1.05	\$1.41	\$0.98	\$1.21	\$0.72	\$1.00	\$0.73

WATER TREATMENT PLANT CAPITAL COSTS

System	Palm Coast	Fox Run	Palms MHP	Point O'Woods	Apache Shores	Crystal River	Lakeside	Hobe Sound
Treatment Type	LS	Filtration	Filtration	Filtration	Filtration	Filtration	Filtration	Filtration
Year Constructed	1980-1981	1993	1993	12/92	1986	1984	1991	1996
WTP Equipment	\$6,602,828	\$169,830	\$56,579	\$127,457	\$17,606	\$24,073	\$87,980	\$1,000,000
Structures & Imp.	\$500,469	\$0	\$0	\$0				\$0
WTP Capacity	6,000,000	724,248	125,000	424,008	83,126	83,126	565,344	6,912,000
Trended WTP Cost (\$/gal)	\$1.18	\$0.24	\$0.47	\$0.31	\$0.25	\$0.35	\$0.17	\$0.14