DOCKET NO.: 951056-WS - [Palm Coast Utility Corporation]

WITNESS: **Direct Testimony of Karen Amaya,** Appearing On Behalf of the Florida Public Service Commission

DATE FILED: May 31, 1996

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FPSC-RECORDS/REPORTING

DIRECT TESTIMONY OF KAREN AMAYA

Q. What is your name and business address?

A. My name is Karen Amaya 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, 1992, I received a Bachelor of Science Degree in Electrical Engineering from Florida State University. In October, 1994, I passed the Fundamentals of Engineering earning recognition as an Engineer Intern. Subsequent to earning my engineering degree, I began employment with the FPSC in March, 1993 where I have worked as an engineer 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 along with preparing recommendations to the Commission. As needed, I participate in research projects, rulemaking, and making presentations on industry issues.

Q. Have you ever testified before the FPSC?

A. No.

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

A. I am: (a) supporting an acceptable allowance for infiltration and inflow, (b) recommending the inclusion of a three year margin reserve for wastewater treatment plant and effluent disposal, 18 months margin reserve for water treatment plant, source of supply, and high service pumping, 12 months margin reserve for lines, and no margin reserve for finished water storage, in the calculation of used and useful, (c) providing used and useful calculations and resulting percentages for specific plant components, and (d) recommending the recognition of economies of scale through the use of a three year margin reserve for wastewater treatment plant and effluent disposal (excluding the effluent storage tank), and the allowance of 100% used and useful for the membrane softening plant building.

Q. Are you relying on any specific resources in making your recommendations?

A. Yes. Currently, the Commission does not have rules which set out a methodology for determining used and useful percentages. Commission staff, however, have been working with industry and the Department of Environmental Protection (DEP) and in May, 1995 issued draft rules. I have incorporated many of the formulas from staff's draft rules in determining the used and useful percentages which I support. With respect to infiltration and inflow, I have referred to EPA's Handbook entitled Sewer System Infrastructure Analysis and Rehabilitation, dated October, 1991. For information on reclaimed effluent storage, I have referred to EPA's Handbook entitled Guidelines for Water Reuse, dated September, 1992. (Please see Exh KAA-1 which is attached to my testimony.)

Q. What is an acceptable level of infiltration and inflow?

A. The Commission has allowed up to 500 gallons per day (gpd)/inch diameter/mile of gravity main for infiltration; however, this allowance does not include inflow. The EPA, in the referenced handbook, allows 40 gallons per capita per day (gpcd) for total infiltration and inflow which is equal to

50% of the base domestic flow of 80 gpcd prior to any flows being considered excessive. Based on these criteria, I believe the utility's proposal to use an allowance of 15% of their derived daily flows in determining wastewater demands is reasonable.

Q. What specific time periods are you suggesting for margin reserve in the used and useful calculations?

A. I agree with the utility's requested 18 month time period for margin reserve for water source of supply and pumping. Further, I believe 18 months is also an appropriate margin reserve period for high service pumping and the membrane softening treatment equipment. The membrane softening plant structure is constructed so as to accommodate a build-out capacity of 6.0 million gallons per day (mgd); to expand capacity beyond the current 2.0 mgd, the utility need only add membrane skids and associated pumping and piping. Based on this, 18 months margin reserve should sufficiently allow for the permitting and installation of one or more additional skids and associated appurtenances. For water and wastewater mains, a one year margin reserve is sufficient. I point out that most, if not all, mains are already constructed. As to wastewater treatment plant and effluent disposal, excluding the effluent storage tank, I believe a three year margin reserve is appropriate. I believe that a three year margin reserve period for these components better accommodates the time required for design, permitting, and construction of plant. Further, a three year margin reserve period for these components allows the utility to build in larger increments of plant, thereby taking advantage of economies of scale without unduly burdening existing customers through higher rates. Since my calculations yield a 100% used and useful percentage for finished water storage, no margin reserve period for this component is necessary nor appropriate.

Q. For the utility's water facilities, what specific used and useful percentages do you support?

A. With the exception of the membrane concentrate line and blend station, the following used and useful percentages are appropriate for the water facilities:

- source of supply and pumping, 64.71% used and useful
- high service pumping, 74.99% used and useful
- lime softening treatment equipment, 100% used and useful
- membrane softening treatment equipment, 34.46% used and useful
- both water treatment structures, 100% used and useful
- finished water storage, 100% used and useful
- distribution mains, 23.49% used and useful
- off-site, transmission mains, 72.46% used and useful
- services, 72.40% used and useful
- fire hydrants, 94.8% used and useful (as requested)

Since discovery pertaining to the capacity and costs of the concentrate line and blend station is still pending, I cannot provide a specific used and useful percentage at this time. If the current concentrate blend station is sized for the build-out capacity of the membrane softening plant, a used and useful adjustment may be appropriate. However, if that is the case, the minimum investment which would have been necessary to construct a smaller capacity blend station to meet current demands should be compared with the investment the utility has made constructing the current blend station and any subsequent used and useful adjustment should not result in a lower percentage of investment in plant than that which would have been necessary for the smaller capacity blend station.

Q. For the utility's wastewater facilities, what used and useful percentages do you support?

A. The following used and useful percentages are appropriate for the utility's wastewater facilities:

- wastewater treatment equipment, 51.41% used and useful
- effluent disposal facilities, excluding effluent storage tank, 56.66% used and useful
- effluent storage tank, 40.00% used and useful
- gravity mains, 34.47% used and useful
- pretreatment effluent pumping system (PEP) mains, 6.33% used and useful
- PEP tanks, 100% used and useful (as requested)
- pumping plant, 29.75% used and useful
- force mains, 58.52% used and useful

The used and useful calculations along with growth and capacity data are attached to my testimony as Exh KAA-2.

Q. Would you describe each calculation, justification for the methodology employed, and the resulting used and useful percentage you have calculated for each of the above components?

A. Yes. To begin, I have utilized the historical ERC data provided by the utility and have run regression analysis on both water and wastewater data to derive growth projections. For the most part, my growth projection numbers match the utility's projections. For comparative purposes, I have projected flows and used and useful percentages for different margin reserve periods, including no margin reserve, on Exh KAA-2; however, the used and useful percentage I support and recommend has been shaded.

For water source of supply and pumping (excluding high service pumping), I believe the utility appropriately reduced total well capacity by deducting the membrane concentrate amount of 353,000 gallons. However, I believe only two maximum wells from the lime softening well supply and one maximum well from the membrane softening well supply should be removed in addition to the concentrate amount in determining the firm reliable capacity for source of supply. Using this methodology, a firm reliable well field capacity of 8,176,120 gpd is calculated. Given the 18 months margin reserve requested by the utility, the resulting used and useful percentage is 64.71%.

Although the utility did not calculate the used and useful percentage for high service pumping equipment, I believe it would be appropriate to do so. However, the break-out of investment between well pumps, backwash pumps, transfer pumps, and high service pumps, if in fact the utility has booked all these costs in NARUC Account 311, may not be possible. The utility has applied the one used and useful percentage calculated for source of supply and pumping to this account. I have calculated used and useful for high service pumping utilizing the two methodologies in the draft rules and the resulting used and useful percentages are lower than that requested by the utility for source of supply. If the investment in high service pumping can be determined, then I believe the used and useful percentage I calculated should be applied to that investment.

The lime softening treatment plant was found to be 100% used and useful in the last rate proceeding, and no expansion was made since that time. It is important to note that the Commission included a fire flow allowance in determining the 100% used and useful for the lime softening treatment plant in the last rate proceeding. There is storage available at both plant sites, along with two elevated storage tanks within the service territory, all of which can accommodate fire flow. This 100% used and useful percentage applies to both the structures and improvements and to water treatment equipment for this plant.

The next used and useful calculation I performed was on the membrane softening treatment equipment. Since the lime softening plant is 100% used and useful, I reduced the projected customer maximum day demand, plus the 600,000 gallon fire flow allowance authorized in the last rate proceeding, by the 5,202,000 gallons produced at the lime softening plant. The remaining flows were then used to calculate used and useful for the membrane softening treatment equipment. Given the 18 month margin reserve period previously discussed, I believe the membrane softening treatment equipment is 34.46% used and useful. I believe that it was prudent and in the interest of economies of scale for the utility to have constructed the build-out capacity for the membrane softening plant structure. Therefore, I believe this structure is 100% used and useful.

To calculate the used and useful percentage for finished water storage, I first determined the firm reliable capacity. Since elevated storage does not have "dead" storage, I deducted 10% dead storage from the ground storage tanks only. I then added the capacity of the two elevated tanks to achieve a firm reliable storage capacity of 3,850,000 gallons. Using the draft rules, I allowed equalization and emergency storage, which is 0.75 of the maximum day demand, and added fire flow. That resulting demand compared to firm reliable capacity yields a capacity greater than 100%. Since it is not possible to utilize more than 100%, I am supporting 100% used and useful.

For determining used and useful on the distribution mains, I utilized the information contained on the utility's water system maps. The maps provide the number of occupied lots and the number of total lots; these numbers exclude beach side and Hammock Dunes. By summing the appropriate numbers, adding a one year margin reserve, the result is 23.49% used and useful. I believe it is appropriate to compare lots connected to lots available, not ERCs connected to lots available. It would be necessary to either convert the number of lots available to ERCs to compare to ERCs connected, or, compare lots connected to lots available in order to compare "apples to apples."

Similarly, for services, I have used lots connected with a one year margin reserve, to services available to derive 72.40% used and useful.

The Commission normally does not recognize a fire flow allowance in the used and useful calculations for mains. However, I point out that the Commission does not generally penalize a utility, either, for installing larger diameter mains which might be used to supply fire flow.

For "off-site" transmission mains, I utilized the utility's hydraulic equivalents which derived the number of lots served. I note that this is not a lots connected to lots available approach; however, the utility has been allowed to use this particular methodology in the last several rate proceedings and I do not think it appropriate at this time to change the methodology as a significant deduction to previously authorized rate base could occur. Further, with transmission mains, unlike distribution mains, in many cases no fewer could have been constructed to serve current customers.

For wastewater treatment equipment, the projected, derived, average annual daily flow with margin reserve was compared to the total plant capacity of 4 mgd. It is important to note that the average annual daily flow is the correct flow demand to use in this case as the 4 mgd capacity was permitted based on this flow design. To use any other flow demand in this case would skew the ratio, resulting in a higher used and useful percentage.

For effluent disposal facilities, I have made two separate calculations. The first is for what I believe should be considered non-reuse disposal <u>for ratemaking purposes</u> in this instance. This includes the two spray fields and the two RIB sites. Again, the projected annual average daily flow demand with a three year margin reserve was compared to the total capacity of these four sites yielding 56.66% used and useful. Again, I point out that the DEP permitted capacity for these four sites is based on annual average daily flow.

For the effluent storage tank which, according to the utility's reuse feasibility study, is used as wet weather storage for the spray fields, I have taken the total capacity of the spray fields and looked at capacity needed based on a required minimum of 3 days (Rule 62-610.414(2)(c), Florida Administrative Code). This methodology results in 40.00% used and useful on the effluent storage tank. Since the effluent storage tank is for wet weather storage, as opposed to a buffer for peaks, I did not deduct dead storage from the tank capacity. Margin reserve is not appropriate for this component in that the spray field capacities do not change with changes in customer demands. However, I believe that economies of scale should be considered for this component. In lieu of margin reserve, I believe that if the utility can support the amount of investment that would have been required to construct a 2.4 million gallon tank for effluent storage, that investment, at a minimum, should be included in rate base. Of course, if that investment should prove to be more than what the utility actually invested in the 6.0 million gallon tank, only the actual investment should be in rate base.

The wastewater collection system for Palm Coast Utility consists of four components, and I have calculated separate used and useful percentages for each component. The first component consists of the gravity mains. Again, I have determined the number of lots connected from the system maps, but have reduced that number by the number of connections using the PEP system. Including a one year margin reserve and comparing this number to the total lots served by gravity mains yields 34.47% used and useful on the gravity mains.

To calculate used and useful on the PEP mains, I took the number of PEP connections that the utility provided, included a one year margin reserve, and divided that number by the total PEP lots available. This results in 6.33% used and useful for the PEP mains. I agree with the utility proposed 100% used and useful for the PEP tanks.

The utility provided a detailed calculation for determining used and useful for pumping plant. I believe the utility's methodology is appropriate except for the use of a peaking factor of 3. In the last rate proceeding, the Commission allowed a peaking factor of 2, and absent justification, I do not believe this factor should be changed at this time. Therefore, I conducted a similar detailed calculation, however, I have used the peaking factor of 2. My calculations are attached in Exh KAA-3. This methodology results in 29.75% used and useful for pumping plant.

The last collection system component is force mains. Again, I followed the utility's methodology. However, since I believe the pumping plant used and useful is 29.75%, this results in a different used and useful percentage on the force mains. By following the utility's methodology, the pumping plant used and useful percentage is used in determining the force mains used and useful percentage. Included in the detail in Exh KAA-2 are the force main details which show the derivation of the 58.52% used and useful I support. I point out that the major manifold footage for the 8" and 10" force mains in my calculations differs from what the utility provides in its used and useful analysis. In the utility's response to the Office of Public Counsel's document request number 3, two different numbers for the 8" and 10" force mains are provided. I have used the hand written numbers in my analysis.

Q. Do you have anything further to add?

A. No.

United States
Environmental Protection
Agency

Office of
Research and Development
Cincinnati, OH 45268

EPA/625/6-91/030
October 1991

Technology Transfer

EPA

Handbook

Sewer System Infrastructure Analysis and Rehabilitation

CHAPTER 2

Regulatory Requirements

2.1 Historical Background

The Water Pollution Control Act Amendments (Public Law 92-500, October 18, 1972), require that the U.S. EPA construction grant applicants investigate the condition of their sewer systems. The grant cannot be approved unless it is documented that each sewer system discharging into such treatment works is not subject to "excessive infiltration and inflow." This requirement was implemented in the Rules and Regulations for Sewer Evaluation and Rehabilitation (40CFR35.927). In addition, I/I analysis and Sewer System Evaluation Surveys (SSES) were required to be conducted on a routine basis to document I/I, and also to indicate the most cost effective method of rehabilitation required to correct the sewer pipe and manhole structure damage.[1]

The I/I analysis should document the non-existence or possible existence of excessive I/I in each sewer system tributary to the treatment works. The analysis should identify the presence and type of I/I that exists in the sewer system including estimated flow rates. The following information should be evaluated and included:

- Estimated flow data at the treatment facility, all significant overflows and bypasses, and, if necessary, flows at key points within the sewer system
- Relationship of existing population and industrial contribution to flows in the sewer system
- Geographical and geological conditions which may affect the present and future flow rates or correction costs for the I/I
- A discussion of age, length, type, materials of construction and known physical conditions of the sewer system

The SSES should include a systematic examination of the sewer system to determine the specific locations, estimated flow rates, method of rehabilitation and cost of rehabilitation versus the cost of transportation and treatment for each defined source of infiltration and each defined source of inflow.[1] The results of the SSES should be summarized in a report that should include:[2]

- A justification for each sewer section cleaned and internally inspected
- A proposed rehabilitation program for the sewer system to eliminate all defined excessive I/I

2.2 Summary of Applicable U.S. EPA and State Regulations

The following is a Summary of Federal and State Regulations and Guidelines for I/I analysis and SSES applicable under the U.S. EPA construction grant program.[1,3]

The grant applicant must determine the I/I conditions in the sewer system by analyzing the preceding year's flow records from existing treatment plant and pump stations. For smaller systems where flow records may not be available, the grant applicant shall obtain flow data by conducting flow monitoring at a single point at the treatment plant during high groundwater periods and also during rainstorms. If there is a likelihood of excessive I/I in a portion of the collection system, it is desirable to monitor that portion separately. <u>No further I/I analysis will be necessary if domestic wastewater plus non-excessive infiltration does not exceed 120 gallons per capita per day (gpcd) during periods of high groundwater. The total daily flow during a storm should not exceed 275 gpcd, and there should be no operational problems, such as surcharges, bypasses or poor treatment performance resulting from hydraulic overloading of the treatment works during storm events.</u> The flow rate of 120 gpcd for infiltration analysis contains two flow components: 80 gpcd of domestic base flow and 40 gpcd of non-excessive infiltration. This is a national average based on the results of a needs survey of 270 Standard Metropolitan Statistical Area Cities. Where the flow rate (domestic base flow and infiltration based on the highest 7 to 14 day average) does not significantly exceed 120 gpcd (in the range of 130 gpcd) the city may proceed with the treatment works design without further analysis. When infiltration significantly exceeds 120 gpcd, further evaluation of the sewer system must be performed to determine the possibility of excessive I/I through a cost effectiveness

United States Environmental Protection Agency

United States Agency for International Development

EPA/625/R-92/004
September 1992

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Manual

Exhibit KAA-1 (Page 3 of 4)

Guidelines for Water Reuse

AVG. YEAR	W/O H.D. ERCs	H.D. ERCs	TOTAL ERCs
1990	10275	255	10530
1991	10935	759	11694
1992	11460	812	12272
1993	12447	1422	13869
1994	13229	1598	14827
1995	14029	817	14846
Projections			
1995.5	14346	852	15198
1996.5	15107	922	16029
1997	15488	957	16445
1998.5	16629	1062	17691
2000.5	18151	1202	19353

Regression Output		
Constant		-1504458
Std Err of Y Est		129.8478
R Squared		0.993391
No. of Observations		6
Degrees of Freedom		4
X Coefficient(s)	761.1143	
Std Err of Coef.	31.03955	

LIME SOFTENING PLANT	
CAPACITY	6.000 mgd
(in plant us	0.798 mgd
REL. CAPY	5.202 mgd

MEMBRANE SOFTENING PLANT	
CAPACITY	2.000 mgd
(in plant us	0.000
REL. CAPY	2.000 mgd

USED AND USEFUL CALCULATIONS PER DRAFT RULES - WATER
[large water system with adequate storage]

NO. OF ERCS, YEAR END 1995	15198	[TEST YEAR]
NO OF ERCS, YEAR END 1996	16029	[1.0 YEAR MR]
NO. OF ERCS, AVG. 1997	16445	[1.5 YEAR MR]
NO. OF ERCS, YEAR END 1998	17691	[3.0 YEAR MR]
NO. OF ERCS, YEAR END 2000	19353	[5.0 YEAR MR]
1995 MAX DAY DEMAND	4,890,000 gpd	[TEST YEAR]
1996 YR END MAX DAY DEMAND	5,157,416 gpd	[1.0 YEAR MR]
1997 MAX DAY DEMAND	5,291,124 gpd	[1.5 YEAR MR]
1998 YR END MAX DAY DEMAND	5,692,248 gpd	[3.0 YEAR MR]
2000 YR END MAX DAY DEMAND	6,227,081 gpd	[5.0 YEAR MR]
REQUIRED FIRE FLOW	600,000 gpd	
	2,000 gpm	

SOURCE OF SUPPLY AND PUMPING

1995 TOTAL WELL CAPACITY	10,719,360 gpd
(less MS plant concentrate)	(353,000) gpd
(less one max well, MS plant)	(1,199,520) gpd
(less two max wells, LS plant)	(990,720) gpd
1995 WELL RELIABLE CAPACITY	8,176,120 gpd
CALCULATED U/U W/O MR	59.81%
CALCULATED U/U W/1.5 YR MR	64.71%
CALCULATED U/U W/3.0 YR MR	69.62%
CALCULATED U/U W/5.0 YR MR	76.16%

HIGH SERVICE PUMPING	PK HR	or	MDD + FF
1995 TOTAL PUMP CAPACITY	11,800 gpm		11,800 gpm
FIRM RELIABLE CAPACITY	9,800 gpm		9,800 gpm
95 PK HR DEMAND (2* MDD)	6,792 gpm		
95 'MAX DAY DEMAND			3,396 gpm
CALCULATED U/U W/O MR	69.30%		55.06%
CALCULATED U/U W/1.5 YR MR	74.99%		57.90%
CALCULATED U/U W/3.0 YR MR	80.67%		60.74%
CALCULATED U/U W/5.0 YR MR	88.25%		64.53%

WATER TREATMENT PLANTS

LIME SOFTENING PLANT	100.00% [from last rate proceeding w/FF]
MEMBRANE SOFTENING PLANT	
RELIABLE CAPACITY	2,000,000 gpd
CALCULATED U/U W/O MR	14.40%
CALCULATED U/U W/1.5 YR MR	34.46%
CALCULATED U/U W/3.0 YR MR	54.51%
CALCULATED U/U W/5.0 YR MR	81.25%

FINISHED WATER STORAGE

TOTAL GST CAPACITY	3,000,000
(LESS DEAD STORAGE OF 10%)	(300,000)
FIRM RELIABLE GST CAPACITY	2,700,000
ELEVATED TANK CAPACITY	1,150,000
TOTAL RELIABLE TANK CAPY	3,850,000
CALCULATED U/U W/O MR	110.84% = 100%
MR NOT NECESSARY DUE TO 100%	

DISTRIBUTION MAINS (< 8" DIAMETER) - NOT BASED ON RULES

LOTS CONNECTED, 10/95 *	10,415
1 YR MARGIN	570
LOTS CONNECTED W/1 YR MR	10,985
LOTS AVAILABLE *	46,764
CALCULATED U/U W/1 YR MR	23.49%
CALCULATED U/U W/1.5 YR MR	24.10%

* These lots do not include beach side, numbers counted on maps

TRANSMISSION [OFF-SITE] MAINS (8" OR GREATER DIAMETER)

LOTS CONNECTED, 10/95 **	34,651
1 YR MARGIN	1,895
LOTS CONNECTED W/1 YR MR	36,546
LOTS AVAILABLE **	50,438
CALCULATED U/U W/1 YR MR	72.46%
CALCULATED U/U W/1.5 YR MR	74.34%

** This number is as filed by PCUC

SERVICES

LOTS CONNECTED, 10/95 *	10,415
1 YR MARGIN	570
LOTS CONNECTED W/1 YR MR	10,985
SERVICES AVAILABLE	15,172
CALCULATED U/U W/1 YR MR	72.40%
CALCULATED U/U W/1.5 YR MR	74.28%

AVG. YEAR	TOTAL ERCs
1990	8820
1991	9682
1992	10140
1993	11053
1994	11842
1995	12435
Projections	
1995.5	12845
1996.5	13573
1997	13936
1998.5	15028
2000.5	16483

Regression Output:		
Constant		-1439195
Std Err of Y Est		110.3086
R Squared		0.994775
No. of Observations		6
Degrees of Freedom		4
X Coefficient(s)	727.6571	
Std Err of Coef.	26.3688	

USED AND USEFUL CALCULATIONS PER DRAFT RULES - WASTEWATER			
NO. OF ERCS, YEAR END 1995	12845		[TEST YEAR]
NO OF ERCS, YEAR END 1996	13573		[1.0 YEAR MR]
NO. OF ERCS, AVG. 1997	13936		[1.5 YEAR MR]
NO. OF ERCS, YEAR END 1998	15028		[3.0 YEAR MR]
NO. OF ERCS, YEAR END 2000	16483		[5.0 YEAR MR]
Average Sewage Flow Per ERC	119.00	gpd	
Allowance for Infiltration/Inflow (15%)	17.85	gpd	
TOTAL FLOWS PER ERC	136.85	gpd	
1995 AVG DAILY FLOW, YR END	1,757,834	gpd	[TEST YEAR]
1996 AVG DAILY FLOW, YR END	1,857,414		[1.0 YEAR MR]
1997 AVG DAILY FLOW	1,907,204		[1.5 YEAR MR]
1998 AVG DAILY FLOW, YR END	2,056,574		[3.0 YEAR MR]
2000 AVG DAILY FLOW, YR END	2,255,734		[5.0 YEAR MR]
DCDD RECLAIMED WATER DEMANDS (Minimum)	300,000	gpd	
DCDD RECLAIMED WATER DEMANDS (Maximum	1,600,000	gpd	[from Reuse Feasibility Study, p. 37]
WASTEWATER TREATMENT EQUIPMENT			
PLANT CAPACITY	4,000,000	gpd	
CALCULATED U/U W/O MR	43.95%		
CALCULATED U/U W/1.5 YR MR	47.68%		
CALCULATED U/U W/3.0 YR MR	51.41%		
CALCULATED U/U W/5.0 YR MR	56.39%		
EFFLUENT DISPOSAL FACILITIES			
NON-REUSE DISPOSAL FACILITIES			
SPRAYFIELDS	800,000	gpd	[per DEP permit]
OLDER RIB SITE	1,300,000		
NEWER RIB SITE	1,000,000		
TOTAL NON-REUSE DISPOSAL CAPACITY	3,100,000	gpd	
CALCULATED U/U W/O MR	47.03%		[flows adjusted to remove 300,000 minimum to DCDD]
CALCULATED U/U W/1.5 YR MR	51.85%		
CALCULATED U/U W/3.0 YR MR	56.66%		
CALCULATED U/U W/5.0 YR MR	63.09%		
WET WEATHER FACILITIES			
STORAGE TANK CAPACITY	6,000,000	gal	
SPRAY FIELDS CAPACITY, 3 DAYS [provides wet weather storage for spray fields, per Reuse Feas. Study, p. 28]	2,400,000		
CALCULATED U/U W/O MR	40.00%		

COLLECTION SYSTEM

GRAVITY MAINS

LOTS CONNECTED, 10/95 *	9,456
(LESS PEP SYSTEM)	(1,281)
TOTAL GRAVITY LOTS CONNECTED	8,175
ONE YEAR MARGIN RESERVE (5.67%)	463
TOTAL LOTS CONNECTED W/1 YR MR	8,638
TOTAL LOTS AVAILABLE	25,062
CALCULATED U/U W/1 YR MR	34.47%
CALCULATED U/U W/1.5 YR MR	35.39%

* lots counted off system maps, beach side not included

PEP MAINS

PEPs CONNECTED	1,281
ONE YEAR MARGIN RESERVE	73
TOTAL PEPs CONNECTED	1,354
TOTAL PEP LOTS AVAILABLE	21,376
CALCULATED U/U W/1 YR MR	6.33%
CALCULATED U/U W/1.5 YR MR	6.50%

PUMPING PLANT

COMBINED CAPACITY OF PUMPING STATIONS	20,496	gpm
COMBINED PEAK DEMAND, PKG FACTOR = 2	5,771	
ONE YEAR MARGIN RESERVE	327	
COMBINED PEAK DEMAND W/1 YR MR	6,098	
CALCULATED U/U W/1 YR MR	29.75%	
CALCULATED U/U W/1.5 YR MR	30.55%	

FORCE MAINS

DIAMETER	TOTAL FT.	MAJOR MANIFOLD	OTHER 29.75%	TOTAL U/U	U/U %	FM COST	U/U AMT
4"	5,672	230	1,619	1,849	32.60%	$34,340	$11,195
6"	65,250	10,091	16,411	26,502	40.62%	$636,382	$258,471
8"	127,975	39,420	26,347	65,767	51.39%	$1,790,738	$920,265
10"	27,333	9,750	5,231	14,981	54.81%	$1,025,174	$561,899
12"	26,073	19,032	2,095	21,127	81.03%	$848,161	$687,261
16"	7,343	7,343	0	7,343	100.00%	$235,746	$235,746
	259,646	85,866	51,703	137,569	58.52%	$4,570,541	$2,674,837

CALCULATED U/U W/1 YR MR 58.52%

	Station	Conn.	Lots Available	Flow	Gen. Serv. &Multi-fam	Total Flow	I&I Allowance	Pk. Sew. Flow (2X)	Peak + I&I (GPD)	(GPM)	Station Capacity	U&U Percent
1	23-1	106	955	12,614		12,614	1,892	25,228	27,120	19	160	11.77%
2	32-1	30	900	3,570		3,570	536	7,140	7,676	5	150	3.55%
3	32-2	134	3337	15,946		15,946	2,392	31,892	34,284	24	225	10.58%
4	30-1	97	1257	11,543		11,543	1,731	23,086	24,817	17	270	6.38%
5	28-1	41	642	4,879		4,879	732	9,758	10,490	7	190	3.83%
6	29-1	82	1024	9,758		9,758	1,464	19,516	20,980	15	300	4.86%
7	29-2	38	757	4,522		4,522	678	9,044	9,722	7	200	3.38%
8	24-1	187	1509	22,253		22,253	3,338	44,506	47,844	33	200	16.61%
9	26-1	230	2509	27,370		27,370	4,106	54,740	58,846	41	180	22.70%
10	33-1	84	1380	9,996		9,996	1,499	19,992	21,491	15	175	8.53%
11	34-1	22	903	2,618		2,618	393	5,236	5,629	4	175	2.23%
12	34-2	315	4740	37,485	175,000	212,485	31,873	424,970	456,843	317	490	64.75%
13	34-3	46	423	5,474		5,474	821	10,948	11,769	8	240	3.41%
14	34-4	47	598	5,593		5,593	839	11,186	12,025	8	330	2.53%
15	63-1	28	609	3,332		3,332	500	6,664	7,164	5	240	2.07%
16	63-2	34	659	4,046		4,046	607	8,092	8,699	6	183	3.30%
17	64-1	59	557	7,021		7,021	1,053	14,042	15,095	10	125	8.39%
18	64-2	5	439	595		595	89	1,190	1,279	1	127	0.70%
19	65-1	30	496	3,570		3,570	536	7,140	7,676	5	129	4.13%
20	65-2	12	369	1,428		1,428	214	2,856	3,070	2	135	1.58%
21	19-1	1678	18719	199,682	175,000	374,682	56,202	749,364	805,566	559	405	138.13%
22	BB-1	27	38	3,213	2,306	5,519	828	11,038	11,866	8	20	41.20%
23	OK-1	0	32	0	20,733	20,733	3,110	41,466	44,576	31	200	15.48%
24	16-1	140	318	16,660		16,660	2,499	33,320	35,819	25	130	19.13%
25	9-1	666	3071	79,254		79,254	11,888	158,508	170,396	118	230	51.45%
26	BB-26	1117	4299	132,923		132,923	19,938	265,846	285,784	198	430	46.15%
27	BB-18	1320	4598	157,080		157,080	23,562	314,160	337,722	235	480	48.86%
28	BB-13	1822	5372	216,818	2,734	219,552	32,933	439,104	472,037	328	640	51.22%
29	BV-1A	67	202	7,973		7,973	1,196	15,946	17,142	12	90	13.23%
30	BU-6	85	124	10,115		10,115	1,517	20,230	21,747	15	60	25.17%
31	BL-8	136	145	16,184		16,184	2,428	32,368	34,796	24	30	80.55%
32	PS-B	2241	5837	266,679	29,433	296,112	44,417	592,224	636,641	442	1050	42.11%
33	14-1	332	634	39,508		39,508	5,926	79,016	84,942	59	133	44.35%
34	4-1	664	1367	79,016		79,016	11,852	158,032	169,884	118	200	58.99%
35	4-2	743	1505	88,417	5,864	94,281	14,142	188,562	202,704	141	600	23.46%
36	PS-E	1100	1984	130,900	7,926	138,826	20,824	277,652	298,476	207	400	51.82%
37	PS-C	357	479	42,483		42,483	6,372	84,966	91,338	63	300	21.14%
38	PS-D	1126	2028	133,994	16,274	150,268	22,540	300,536	323,076	224	231	97.12%
39	AA-18	6	6	714		714	107	1,428	1,535	1	20	5.33%
40	AA-12	29	29	3,451		3,451	518	6,902	7,420	5	260	1.98%
41	AG-13	77	89	9,163		9,163	1,374	18,326	19,700	14	56	24.43%
42	AG-5	126	138	14,994	1,512	16,506	2,476	33,012	35,488	25	56	44.01%
43	AQ-3	57	57	6,783		6,783	1,017	13,566	14,583	10	21	48.23%
44	AA-8	322	334	38,318	1,512	39,830	5,975	79,660	85,635	59	310	19.18%
45	AU-5	36	39	4,284		4,284	643	8,568	9,211	6	186	3.44%
46	AA-5	439	459	52,241	1,512	53,753	8,063	107,506	115,569	80	350	22.93%
47	PS-A	458	481	54,502	2,919	57,421	8,613	114,842	123,455	86	300	28.58%
48	GH-6	378	378	44,982		44,982	6,747	89,964	96,711	67	166	40.46%
49	GG-7A	431	443	51,289		51,289	7,693	102,578	110,271	77	166	46.13%
50	GJ-5A	132	132	15,708		15,708	2,356	31,416	33,772	23	125	18.76%
51	PS-G	660	672	78,540		78,540	11,781	157,080	168,861	117	350	33.50%
52	11-2	292	963	34,748		34,748	5,212	69,496	74,708	52	230	22.56%
53	11-1	618	1453	73,542		73,542	11,031	147,084	158,115	110	270	40.67%
54	PS-K	0	0	0	4,063	4,063	609	8,126	8,735	6	280	2.17%
55	OK-1	0	0	0	12,503	12,503	1,875	25,006	26,881	19	310	6.02%
56	F.R.P.	0	0	0	10,603	10,603	1,590	21,206	22,796	16	103	15.37%
57	CL-1	0	0	0	283	283	42	566	608	0	250	0.17%
58	PS-W	0	58	0	203	203	30	406	436	0	360	0.08%
59	FF-29	70	403	8,330	3,711	12,041	1,806	24,082	25,888	18	175	10.27%
60	FF-21	166	787	19,754	5,712	25,466	3,820	50,932	54,752	38	290	13.11%
61	FD-2	43	191	5,117		5,117	768	10,234	11,002	8	136	5.62%
62	FF-11	43	137	5,117		5,117	768	10,234	11,002	8	125	6.11%
63	FF-11A	364	1497	43,316	5,712	49,028	7,354	98,056	105,410	73	500	14.64%
64	39-1	416	1739	49,504	5,712	55,216	8,282	110,432	118,714	82	275	29.98%
65	37-3	17	805	2,023		2,023	303	4,046	4,349	3	180	1.68%
66	37-2	30	595	3,570		3,570	536	7,140	7,676	5	237	2.25%
67	37-1	23	664	2,737		2,737	411	5,474	5,885	4	237	1.72%
68	35-4	98	1309	11,662		11,662	1,749	23,324	25,073	17	250	6.96%
69	35-3	65	694	7,735		7,735	1,160	15,470	16,630	12	225	5.13%
70	35-2	61	79	7,259		7,259	1,089	14,518	15,607	11	180	6.02%
71	35-1	51	523	6,069		6,069	910	12,138	13,048	9	280	3.24%
72	12-1	243	878	28,917		28,917	4,338	57,834	62,172	43	190	22.72%
73	13-3	853	7053	101,507		101,507	15,226	203,014	218,240	152	138	109.82%
74	13-2	933	7179	111,027		111,027	16,654	222,054	238,708	166	138	120.12%
75	13-4	130	415	15,470		15,470	2,321	30,940	33,261	23	130	17.77%
76	13-5	50	308	5,950	776	6,726	1,009	13,452	14,461	10	200	5.02%
77	IP-3	0	0	0	137	137	21	274	295	0	150	0.14%
78	IP-1	0	0	0	4,848	4,848	727	9,696	10,423	7	450	1.61%
79	IP-3	0	0	0	5,864	5,864	880	11,728	12,608	9	120	7.30%
80	13-1	1173	7977	139,587	13,160	152,747	22,912	305,494	328,406	228	530	43.03%
81	27-1	156	399	18,564		18,564	2,785	37,128	39,913	28	115	24.10%
82	21-1	406	923	48,314		48,314	7,247	96,628	103,875	72	82	87.97%
83	22-4	173	553	20,587		20,587	3,088	41,174	44,262	31	100	30.74%
84	22-1	516	1200	61,404		61,404	9,211	122,808	132,019	92	116	79.03%
85	22-3	93	404	11,067		11,067	1,660	22,134	23,794	17	120	13.77%

	Station	Conn.	Lots Available	Flow	Gen. Serv. &Multi-fam	Total Flow	I&I Allowance	Pk. Sew. Flow (2X)	Peak + I&I (GPD)	(GPM)	Station Capacity	U&U Percent
86	22-2	852	2010	101,388		101,388	15,208	202,776	217,984	151	80	189.22%
87	20-1	1540	3298	183,260		183,260	27,489	366,520	394,009	274	321	85.24%
88	20-3	19	90	2,261		2,261	339	4,522	4,861	3	210	1.61%
89	20-2	254	31	30,226		30,226	4,534	60,452	64,986	45	194	23.26%
		28,147	122,687	3,349,493	516,012	3,865,505	579,826	7,731,010	8,310,836	5,771	20,496	28.16%

I&I Allowance	0.15
u/u % derived	28.16%