Section 6.0 – Analysis of Water Supply Options

6.1 Analysis of Water Supply Options

In a review of the various water supplies several considerations were analyzed to determine the viability of utilizing each of the different types of water supplies. These areas as outlined in Section 2.1, consist of the following;

- FWG = Freshwater ground; minimal treatment, no salt removal
- FBS = Freshwater brackish surface; some salt removal (250 mg/L - 3,000 mg/L Cl^-)
- FBG = Freshwater brackish groundwater; some salt removal (250 mg/L - 3,000 mg/L Cl^-)

- BWS = Brackish Water Surface; moderate salt removal required (3,000 mg/L to 10,000 mg/L Cl^-)
- BWG = Brackish Water Ground; moderate salt removal required (3,000 mg/L to 10,000 mg/L Cl^-)
- DS = Desalination Surface Water; high salt removal required (>10,000 mg/L Cl^-)
- DG = Desalination Groundwater; high salt removal required (>10,000 mg/L Cl^-), i.e. the use of a deep well for raw water supply

6.1.1 Cost Analysis of Freshwater Ground

Existing Disston Avenue Wells;

Two of the three wells within the existing Disston Avenue wellfield, well 5B and well 5D, exhibited water quality that meets all drinking water standards. These wells are permitted through the Southwest Water Management District in a "Stand By" status and are incorporated into the City of Tarpon Springs Water Use Permit. Each of these existing wells along Disston Avenue has a total average daily permitted water withdrawal of 0.216 mgd (million gallons per day) and a peak permitted water withdrawal of 0.252 mgd. The combined total gallons of these two (2) wells could provide the City with an additional 0.432 mgd on an average daily basis.

This production from Disston Avenue wells 5B and 5D combined with the City's existing three (3) permitted productions wells could provide the a total average daily production of 1.16 mgd at approximately one-fourth (1/4th) the current cost of purchased water. Currently the City's wholesale cost for potable water is $2.09/1,000 gallons in comparison to a freshwater well production cost of approximately $0.55/ 1,000 gallons. Based upon the cost analysis wells 5B & 5D could be retrofitted to provide additional water with minimal treatment required.

Based upon minimal cost associated with these well improvements and the low cost of water production, this option is being considered as a priority. Scheduled completion of these improvements is approximately July 2004.

Water quality analysis on Disston Avenue well 5C indicated a presence of iron concentrations of 1.5 mg/L. This concentration is above the regulatory secondary Maximum Contaminant Level (MCL) for iron and would require additional treatment to remove/reduce concentration to acceptable levels. After a review of the water quality and cost associated with these improvements it is recommended that well 5C remain unimproved at this time.

Well 5A currently is permitted as "irrigation" with a permitted capacity of 0.012 mgd. An inspection was performed on well 5A's pump and casing to determine the low yield that this well has had in the past. After removing the well pump and motor it was discovered that the pump and motor was inadequate in size. Due to past information of a pump and motor being dropped into the well casing during pump and motor installation, the well casing was inspected using video photography. The inspection showed no obstruction in the well casing or open hole.

In an effort to determine if well 5A is able to produce capacities similar to 5B and 5D, this well will be tested with well pump equipment similar in size to 5B and 5D. Improvements will be proposed for this well if it is able to produce similar capacities as the other two (2) existing wells.

Based upon the combined capacities of the fresh water wells listed below, the estimated cost of produced water is approximately $0.55/1000 gallons.

Well #1	0.151 mgd
Well #2	0.500 mgd
Well #3	0.075 mgd
Well 5A	0.216 mgd
Well 5B	0.216 mgd
Well 5D	0.216 mgd
Total	1.370 mgd

Future Expansion of Groundwater Wells;

Two areas have been identified as potential groundwater supply areas. These areas were along the Progress Energy of Florida high voltage transmission easement from approximately Sandy Hollow Drive south along Disston Avenue, south of Klosterman Road approximately ½ mile, west from Lillian Road east to U.S. Hwy 19. The other area identified in the study was an area near Lake Tarpon south of Tarpon Avenue along Highland Avenue and from Lake Tarpon east to Richard Ervin Parkway (Section 6, figure 6-1). Due to development and future planned development in the Lake Tarpon area the siting and placement of any groundwater production wells would be difficult.

A preliminary investigation was performed as to the feasibility of developing additional groundwater from the area along Disston Avenue south of Klosterman Road, approximately ½ mile, west from Lillian Road east to U.S. Hwy 19. This investigation included a visual examination of the area, GIS aerial photography and Topographic imagery. Contour elevations of the land along Progress Energy high voltage line easement and east to St. Petersburg College indicate that additional groundwater wells could possibly be installed.

Based upon the existing wells located along Disston Avenue, there is the possibility that future wells may produce adequate flows and acceptable water quality. Seasonal variations in water availability, along with fresh ground water permitting requirements, would need to be factored into any future development of these fresh water wells. Current information indicates the possibility that wells developed in this area could each produce up to 0.2 mgd. Due to

uncertainties in freshwater well development, it is recommended that additional freshwater development remain as a future consideration.

Cost analysis of recommended alternative water supplies and treatment other than freshwater.

The following cost analysis is provided for alternative potable drinking water supplies that would provide for the current and future needs of the City of Tarpon Springs.

Each of the options listed within this section is provided for reference and comparison of other alternative potable drinking water options and the projected costs for the development of those options. These costs illustrate various alternative water supplies that exist within the Tarpon Springs area. Included in these costs are: the projected cost to construct, operate and maintain the facility; and, the cost per 1,000 gallons to produce an acceptable, reliable, potable drinking water supply for the City of Tarpon Springs.

Included in the following table is a summary of all the alterative potable water supply options that were analyzed and available based upon hydrological conditions to the Tarpon Springs area, excluding freshwater. More detailed cost tables and brief narratives follow the summary tables for the various options that were considered as viable and reliable alternative potable drinking water supplies.

Cost Analysis Summary Sheet of All Advanced Water Treatment Options

Brackish groundwater treatment plant Cl⁻ =<5000 mg/L					
Annual operational costs assuming $31M plant and facilities for 4 mgd					
Total Capital Cost	$ 31,000,000.00				
annual water production	1,460,000	thousands	$/1000 =	$	2.37
Annual operational costs assuming $36M plant and facilities for 5 mgd					
Total Capital Cost	$ 36,000,000.00				
annual water production	1,825,000	thousands	$/1000 =	$	2.26
Annual operational costs assuming $53M plant and facilities for 8 mgd					
Total Capital Cost	$ 53,000,000.00				
annual water production	2,920,000	thousands	$/1000 =	$	2.07

Brackish groundwater treatment plant Cl⁻ =<10,000 mg/L					
Annual operational costs assuming $43M plant and facilities for 4 mgd					
Total Capital Cost	$ 43,000,000.00				
annual water production	1,460,000	thousands	$/1000 =	$	2.96
Annual operational costs assuming $51M plant and facilities for 5 mgd					
Total Capital Cost	$ 51,000,000.00				
annual water production	1,825,000	thousands	$/1000 =	$	2.85
Annual operational costs assuming $78M plant and facilities for 8 mgd					
Total Capital Cost	$ 78,000,000.00				
annual water production	2,920,000	thousands	$/1000 =	$	2.70

Seawater treatment plant Cl⁻ >10,000 mg/L					
Annual operational costs assuming $75M plant and facilities for 4mgd					
Total Capital Cost	$ 75,000,000.00				
annual water production	1,460,000	thousands	$/1000 =	$	4.69
Annual operational costs assuming $83M plant and facilities for 5 mgd					
Total Capital Cost	$ 83,000,000.00				
annual water production	1,825,000	thousands	$/1000 =	$	4.24
Annual operational costs assuming $125M plant and facilities for 8 mgd					
Total Capital Cost	$ 125,000,000.00				
annual water production	2,920,000	thousands	$/1000 =	$	3.93

Groundwater treatment plant Cl⁻ >10,000 mg/L					
Annual operational costs assuming $49M plant and facilities for 4 mgd					
Total Capital Cost	$ 49,000,000.00				
annual water production	1,460,000	thousands	$/1000 =	$	3.33
Annual operational costs assuming $59M plant and facilities for 5 mgd					
Total Capital Cost	$ 59,000,000.00				
annual water production	1,825,000	thousands	$/1000 =	$	3.23
Annual operational costs assuming $89M plant and facilities for 8 mgd					
Total Capital Cost	$ 89,000,000.00				
annual water production	2,920,000	thousands	$/1000 =	$	3.00

6.1.2 Cost Analysis of Slightly Brackish Surface Water

As part of the analysis for the utilization of Slightly Brackish Surface Water as the City's alternative water supply, information was reviewed from the SWFWMD, TBW (White Paper; Seawater Desalination Intake and Discharge July 2002) and the USGS (Surface-Water Hydrology and Salinity of the Anclote River Estuary, Florida 1990).

To use Brackish Surface water the same regulations apply as with Fresh Surface water. Based upon data, it is anticipated that MFL criteria would apply to this project. Information supplied by the SWFWMD from other surface water projects in the region, only a maximum of 10% of the flow over and above the MFL criteria would be allowed to be withdrawn. Reviewing the flow data from the USGS study, the minimum flow during the dry season is approximately 1.3 mgd. Since only a fraction of this amount would be allowed to be withdrawn, it appears that there would be portions of the year when little if any surface water withdrawal would be permitted. Because this could not be a viable supply without significant seasonal storage, this option does not appear feasible enough to develop a cost analysis.

6.1.3 Cost Analysis of Brackish Groundwater = < 5,000 mg/L Cl^-

Information gathering was performed on the possibility of utilizing brackish groundwater as an alternative water supply to provide the ability of being self- supplied. Based upon information, it was determined this alternative is a favorable option and may possibly provide additional water for population growth and future sale.

To provide a cost analysis utilizing this type of groundwater, multiple factors were examined and taken into consideration, including:

1. Type and Level of Treatment required
2. Plant Size
3. Land Requirements
4. Plant Design
5. Distribution Piping
6. Concentrate Disposal Method
7. O&M Costs
8. Well Siting and Piping
9. Well Depth
10. Well Diameter
11. Well Production
12. Number of Wells

Information from the various permitting agencies, surrounding municipalities, technical documentations, and various Engineering firms was reviewed. Section 6, Table 6-1a, b and c (RO Plant Cl- 3,000 mg/L to 5,000 mg/L.), contains a breakdown of those costs associated with the construction, operation, maintenance, and estimated cost per 1,000 gallons of water produced. These calculations are estimated for the three (3) different sized plants which were determined to meet the current needs and address the possibility of producing water that might be sold to other water suppliers within the region.

Cost estimates for a brackish RO water plant were performed for finished water capacities of 4mgd, 5mgd and 8mgd. All costs contained within Section 6, Table 6-1 include estimations for plant size (based upon TDS/Cl^- values), number of wells (based upon set production), equipment requirements, building requirements, land requirements, distribution piping requirements, concentrate disposal piping requirements (surface water discharge), anticipated pretreatment and storage requirements, and other associated additional costs.

***** ***Note:*** ***The tables in this section summarize the primary cost components on a marginal cost basis (costs in addition to existing City resources). This information is based on standard assumptions for comparative basis to other options presented in this section. These Assumptions are based upon best available information and include a 30-year debt period and an interest rate of 6%. Actual costs and debt services may vary. Debt services period and interest rate of more or less will increase or decrease total cost per 1,000 gallons.***

The projected estimated cost per 1,000 gallons of finished water, assuming a thirty (30) year debt service is:

1. 4mgd Brackish groundwater treatment plant Cl^- =<5,000 mg/L cost per 1,000 gallons = $2.37

Section 6, Table 6-1a

well production 200 GPM							
Annual operational costs assuming $31M plant and facilities for 4 mgd							
Total Capital Cost	$31,000,000						
interest rate	6.0%						
Term	30	years					
Debt Service (annual)	$2,252,116.26						
$ 2,252,116.26	debt service						
$ 400,000.00	Personnel	include insurance, workers comp, FICA, SS Medicare, retirement, overtime					
$ 803,000.00	operation and maintenance; based on		$0.55	per 1000 for O&M			
$ 3,455,116.26	TOTAL		$0.35	in 1993 =	$0.52	in 2003	
annual water production							
1,460,000	thousands						
$/1000 =	$2.37						

2. 5mgd Brackish groundwater treatment plant Cl^- =<5,000 mg/L cost per 1,000 gallons = $2.26

Section 6, Table 6-1b

well production 200 GPM							
Annual operational costs assuming $36M plant and facilities for 5 mgd							
Total Capital Cost	$36,000,000						
interest rate	6%						
Term	30	years					
Debt Service (annual)	$2,615,360.81						
$ 2,615,360.81	debt service						
$ 500,000.00	personnel	include insurance, workers comp, FICA, SS Medicare, retirement, overtime					
$ 1,003,750.00	operation and maintenance; based on		$0.55	per 1000 for O&M			
$ 4,119,110.81	TOTAL		$0.35	in 1993 =	$0.52	in 2003	
annual water production							
1,825,000	thousands						
$/1000 =	$2.26						

3. 8mgd Brackish groundwater treatment plant Cl^- =<5,000 mg/L cost per 1,000 gallons = $2.07

Section 6, Table 6-1c

well production 200 GPM						
Annual operational costs assuming $53M plant and facilities for 8 mgd						
Total Capital Cost	$53,000,000					
interest rate	6%					
term	30 years					
Debt Service (annual)	$3,850,392.31					
$ 3,850,392.31	debt service					
$ 600,000.00	personnel	include insurance, workers comp, FICA, SS Medicare, retirement, overtime				
$ 1,606,000.00	operation and maintenance; based on		$0.55	per 1000 for O&M		
$ 6,056,392.31	TOTAL		$0.35	in 1993 =	$0.52	in 2003
annual water production						
2,920,000	thousands					
$/1000 =	$2.07					

6.1.4 Cost Analysis of Brackish Surface Water

A review of information for this analysis determined the possibility of adequate withdrawals of Brackish Surface Water from the Anclote River would be limited. The Anclote River may not be suitable based upon TBW's research, sizing and depth of intake structures.

In addition other factors were considered in the evaluation of the utilization of surface water as a source of drinking water. These include: uncertain reliability of water quality (seasonal/tidal influences), total percentage of withdrawals at seasonal minimum flows, permitting issues, and costs of construction. The uncertainty of a reliable quality and quantity of surface water from the Anclote River limits the feasibility of this option.

6.1.5 Cost Analysis of Brackish Water Ground =<10,000 mg/L Cl^-

Information regarding the used of Brackish Ground Water (<10,000 mg/L Cl^-) from permitting agencies, surrounding municipalities, technical documentations, and Engineering firms was reviewed for this analysis. From this information, cost analysis were performed on the feasibility of utilizing brackish groundwater with Cl^- =<10,000 mg/L. to provide an ample and continuous supply of drinking water at a reasonable cost. A cost analysis was performed for construction and the projected cost per 1,000 gallons to produce drinking water. As part of the cost analysis, multiple considerations were examined, including:

1. Type of Treatment required
2. Plant Size
3. Land Requirements
4. Plant Design
5. Distribution Piping
6. Concentrate Disposal Method

7. O&M Costs
8. Well Siting and Piping
9. Well Depth
10. Well Diameter
11. Well Production
12. Number of Wells

Section 6, Table 6-2 a, b and c (RO Plant Cl- 5,000 mg/L to 10,000 mg/L.), is a breakdown of the cost associated with the construction, operation, maintenance, and cost per 1,000 gallons of water produced. These calculations are estimated for the three (3) different sized plants determined to meet current needs and the possibility of producing water that might be sold to Tampa Bay Water.

Cost estimates for the brackish RO plant are based on finished water capacities of 4mgd, 5mgd and 8mgd. All costs contained within Section 6, Table 6-2 a, b and c include estimations for plant size (based upon TDS/Cl- values), number of wells (based upon set production), equipment requirements, building requirements, land requirements, distribution piping requirements, concentrate disposal piping requirements (surface water discharge), anticipated pretreatment and storage requirements, and other associated additional costs.

***** ***Note:*** ***The tables in this section summarize the primary cost components on a marginal cost basis (costs in addition to existing City resources). This information is based on standard assumptions for comparative basis to other options presented in this section. These Assumptions are based upon best available information and include a 30-year debt period and an interest rate of 6%. Actual costs and debt services may vary. Debt services period and interest rate of more or less will increase or decrease total cost per 1,000 gallons.***

The projected estimated cost per 1,000 gallons of finished water, assuming a thirty (30) year debt service is:

1. 4mgd Brackish groundwater treatment plant Cl^- =<10,000 mg/L cost per 1,000 gallons = $2.96

Section 6, Table 6-2a

well production 200 GPM						
Annual operational costs assuming $43M plant and facilities for 4 mgd						
Total Capital Cost	$43,000,000					
interest rate	6.0%					
Term	30	years				
Debt Service (annual)	$3,123,903.19					
$ 3,123,903.19	debt service					
$ 400,000.00	personnel	include insurance, workers comp, FICA, SS Medicare, retirement, overtime				
$ 803,000.00	operation and maintenance; based on	$0.55	per 1000 for O&M			
$ 4,326,903.19	TOTAL	$0.35	in 1993 =	$0.52	in 2003	
annual water production						
1,460,000	thousands					
$/1000 =	$2.96					

2. 5mgd Brackish groundwater treatment plant Cl- =<10,000 mg/L cost per 1,000 gallons = $2.85

Section 6, Table 6-2b

well production 200 GPM							
Annual operational costs assuming $51M plant and facilities for 5 mgd							
Total Capital Cost	$51,000,000						
interest rate	6.0%						
Term	30	years					
Debt Service (annual)	$3,705,094.49						
$ 3,705,094.49	debt service						
$ 500,000.00	personnel	include insurance, workers comp, FICA, SS Medicare, retirement, overtime					
$ 1,003,750.00	operation and maintenance; based on		$0.55	per 1000 for O&M			
$ 5,208,844.49	TOTAL		$0.35	in 1993 =	$0.52	in 2003	
annual water production							
1,825,000	thousands						
$/1000 =	$2.85						

3. 8mgd Brackish groundwater treatment plant Cl- =<10,000 mg/L cost per 1,000 gallons = $2.70

Section 6, Table 6-2c

well production 200 GPM							
Annual operational costs assuming $78M plant and facilities for 8 mgd							
Total Capital Cost	$78,000,000						
interest rate	6.0%						
Term	30	years					
Debt Service (annual)	$5,666,615.10						
$ 5,666,615.10	debt service						
$ 600,000.00	Personnel	include insurance, workers comp, FICA, SS Medicare, retirement, overtime					
$ 1,606,000.00	operation and maintenance; based on		$0.55	per 1000 for O&M			
$ 7,872,615.10	TOTAL		$0.35	in 1993 =	$0.52	in 2003	
annual water production							
2,920,000	Thousands						
$/1000 =	$2.70						

6.1.6 Desalination Surface Water >10000 mg/L Cl^-

Various reference materials were reviewed as part of an analysis for the utilization of Seawater Desalination >10,000 mg/L as an alternative water supply, It was determined that the possibility of adequate withdrawals off the river would be limited. In addition, it must be noted that based upon TBW's research regarding sizing and depth of intake structures, the Anclote River may not be suitable.

Other factors were considered in the evaluation of the utilization of seawater as a source of drinking water. These include uncertain reliability of water quality (seasonal/tidal influences), total percentage of withdrawals at seasonal minimum flows, permitting issues, and costs of construction. Based upon these parameters and concerns, seawaters along the Gulf of Mexico with Cl^- >10,000 mg/L. are considered a better option for producing drinking water than the Anclote River.

Information from the various permitting agencies, surrounding municipalities, technical documentations, and various Engineering firms was reviewed. From this information cost analysis were performed on the feasibility of utilizing brackish groundwater with Cl^- >10,000 mg/L. to provide an ample and continuous supply of drinking water at a reasonable cost. As part of the cost analysis multiple considerations were examined, these included:

1. Type of Treatment required
2. Plant Size
3. Land Requirements
4. Plant Design
5. Distribution Piping
6. Concentrate Disposal Method
7. O&M Costs

Through information gathered, a cost analysis was performed for construction and the projected cost per 1,000 gallons to produce drinking water.

Section 6, Table 6-3 a, b and c (RO Plant Cl- >10,000 mg/L.), is a breakdown of those costs associated with the construction, operation, maintenance, and estimated cost per 1,000 gallons of water produced. These calculations are estimated for the three (3) different sized plants that were determined to meet the City's current needs and possible water that might be sold.

The cost estimation for the seawater desalination drinking water plant is based on plants sized at 4mgd, 5mgd and 8mgd. All costs contained within Section 6, Table 6-3 include estimations for plant size (based upon TDS/Cl- values), equipment requirements, building requirements, land requirements, distribution piping requirements, concentrate disposal piping requirements, intake piping and structure, anticipated pretreatment and storage requirements, and other associated additional costs.

***** ***Note:*** ***The tables in this section summarize the primary cost components on a marginal cost basis (costs in addition to existing City resources). This information is based on standard assumptions for comparative basis to other options presented in this section. These Assumptions are based upon best available information and include a 30-year debt period and an interest rate of 6%. Actual costs and debt services may vary. Debt services period and interest rate of more or less will increase or decrease total cost per 1,000 gallons.***

Based upon this data, the estimated cost per 1,000 gallons of finished drinking water is as follows:

1. 4mgd Seawater treatment plant Cl^- >10,000 mg/L cost per 1,000 gallons = $4.69

Section 6, Table 6-3a

Intake Production 500GPM

Annual operational costs assuming $75M plant and facilities for 4mgd						
Total Capital Cost	$75,000,000					
interest rate	6.0%					
Term	30	years				
Debt Service (annual)	$5,448,668.36					
$ 5,448,668.36	debt service					
$ 600,000.00	personnel	include insurance, workers comp, FICA, SS Medicare, retirement, overtime				
$ 803,000.00	operation and maintenance; based on		$0.55	per 1000 for O&M		
$ 6,851,668.36	TOTAL		$0.35	in 1993 =	$0.52	in 2003
annual water production						
1,460,000	thousands					
$/1000 =	$4.69					

2. 5mgd Seawater treatment plant Cl^- >10,000 mg/L cost per 1,000 gallons = $4.24

Section 6, Table 6-3b

Intake Production 500GPM

Annual operational costs assuming $83M plant and facilities for 5 mgd						
Total Capital Cost	$83,000,000					
interest rate	6.0%					
Term	30	years				
Debt Service (annual)	$6,029,859.65					
$ 6,029,859.65	debt service					
$ 700,000.00	personnel	include insurance, workers comp, FICA, SS Medicare, retirement, overtime				
$ 1,003,750.00	operation and maintenance; based on		$0.55	per 1000 for O&M		
$ 7,733,609.65	TOTAL		$0.35	in 1993 =	$0.52	in 2003
annual water production						
1,825,000	thousands					
$/1000 =	$4.24					

3. 8mgd Seawater treatment plant Cl^- =<1,000 mg/L cost per 1,000 gallons
   = $3.93

Section 6, Table 6-3c

Intake production 500 GPM

Annual operational costs assuming $125M plant and facilities for 8 mgd						
Total Capital Cost	$125,000,000					
interest rate	6.0%					
Term	30	years				
Debt Service (annual)	$9,081,113.94					
$ 9,081,113.94	debt service					
$ 800,000.00	personnel	include insurance, workers comp, FICA, SS Medicare, retirement, overtime				
$ 1,606,000.00	operation and maintenance; based on		$0.55	per 1000 for O&M		
$ 11,487,113.94	TOTAL		$0.35	in 1993 =	$0.52	in 2003
annual water production						
2,920,000	thousands					
$/1000 =	$3.93					

6.1.7 Desalination Groundwater >10,000 mg/l Cl^-

Data was reviewed from permitting agencies, surrounding municipalities, technical documentations, and engineering firms in order to perform a cost analysis on the feasibility of utilizing brackish groundwater with Cl- >10,000 mg/L. to provide an ample and continuous supply of drinking water at a reasonable cost. As part of the cost analysis multiple considerations were examined, including:

1. Type of Treatment required
2. Plant Size
3. Land Requirements
4. Plant Design
5. Distribution Piping
6. Concentrate Disposal Method
7. O&M Costs
8. Well Siting and Piping
9. Well Depth
10. Well Diameter
11. Well Production
12. Number of Wells

A cost analysis was performed on the projected cost of producing 1,000 gallons of drinking water.

Section 6, Table 6-4 a, b and c (RO Plant Cl >10,000 mg/L.), is a breakdown of those cost associated with the construction, operation, maintenance, and estimated cost per 1,000 gallons of water produced. These calculations are estimated for the three (3) different sized plants determined to meet current needs of the City of Tarpon Springs and the possibility of producing water that might be sold.

The cost estimation for the brackish drinking water plants, which are sized at, 4mgd, 5mgd and 8mgd, is as follows. All costs contained within Section 6, Table 6-4 include estimations for plant size (based upon TDS/Cl- values), number of wells (based upon set production), equipment requirements, building requirements, land requirements, distribution piping requirements, concentrate disposal piping requirements (surface water discharge), anticipated pretreatment and storage requirements, and other associated additional costs.

***** ***Note:*** ***The tables in this section summarize the primary cost components on a marginal cost basis (costs in addition to existing City resources). This information is based on standard assumptions for comparative basis to other options presented in this section. These Assumptions are based upon best available information and include a 30-year debt period and an interest rate of 6%. Actual costs and debt services may vary. Debt services period and interest rate of more or less will increase or decrease total cost per 1,000 gallons.***

Based upon this data, projected estimated cost per 1,000 gallons of finished drinking water is:

1. 4mgd Groundwater treatment plant Cl^- >10,000 mg/L cost per 1,000 gallons = $3.33

Section 6, Table 6-4a

well production 300 GPM

Annual operational costs assuming $49M plant and facilities for 4 mgd						
Total Capital Cost	$49,000,000					
interest rate	6.0%					
Term	30	years				
Debt Service (annual)	$3,559,796.66					
$ 3,559,796.66	debt service					
$ 500,000.00	personnel	include insurance, workers comp, FICA, SS Medicare, retirement, overtime				
$ 803,000.00	Operation and maintenance; based on		$0.55	per 1000 for O&M		
$ 4,862,796.66	TOTAL		$0.35	in 1993 =	$0.52	in 2003
annual water production						
1,460,000	thousands					
$/1000 =	$3.33					

2. 5mgd Groundwater treatment plant Cl^- >10,000 mg/L cost per 1,000 gallons = $3.23

Section 6, Table 6-4b

well production 300 GPM

Annual operational costs assuming $59M plant and facilities for 5 mgd						
Total Capital Cost	$59,000,000					
interest rate	6.0%					
Term	30	years				
Debt Service (annual)	$4,286,285.78					
$ 4,286,285.78	debt service					
$ 600,000.00	personnel	include insurance, workers comp, FICA, SS Medicare, retirement, overtime				
$ 1,003,750.00	Operation and maintenance; based on		$0.55	per 1000 for O&M		
$ 5,890,035.78	TOTAL		$0.35	in 1993 =	$0.52	in 2003
annual water production						
1,825,000	thousands					
$/1000 =	$3.23					

3. 8mgd Groundwater treatment plant Cl^- =<10,000 mg/L cost per 1,000 gallons = $3.00

Section 6, Table 6-4c

well production 300 GPM

Annual operational costs assuming $89M plant and facilities for 8 mgd						
Total Capital Cost	$89,000,000					
interest rate	6%					
Term	30	years				
Debt Service (annual)	$6,465,753.12					
$ 6,465,753.12	debt service					
$ 700,000.00	personnel	include insurance, workers comp, FICA, SS Medicare, retirement, overtime				
$ 1,606,000.00	operation and maintenance; based on		$0.55	per 1000 for O&M		
$ 8,771,753.12	TOTAL		$0.35	in 1993 =	$0.52	in 2003
annual water production						
2,920,000	thousands					
$/1000 =	$3.00					

6.2 Summary of Analysis of Water Supply Options

While fresh groundwater offers the most economical source, this is a limited resource in the area and fresh groundwater alone does not offer sufficient capacity to meet the needs of the community. Of all of the options reviewed, brackish groundwater offers the most feasible and economical means of gaining additional water supply capacity sufficient for the City. The ultimate cost will depend on more detailed information gathered during the testing and design phase. Our research indicates this option will be more economical in the long run than continuing to rely on outside sources.

The following references were used in the development of cost estimates in this section:

Southwest Florida Water Management District (SWFWMD) Permit Section, CH2MHILL (City of Tarpon Springs Investigation For Additional Water Supply 1978), the City of Oldsmar (John Mulvihill, Public Works/Utilities Director), City of Clearwater (Clearwater Well and RO Project), City of Dunedin (USGS Assessment of the Fresh-and Brackish-Water Resources Underlying Dunedin and Adjacent Areas of Northern Pinellas County, Florida), Tampa Bay Water (Project Overview Mid Pinellas Brackish Water Plant and), Tampa Bay Water (White Paper; Seawater Desalination Intake and Discharge July 2002) and the United States Geological Survey (USGS Surface-Water Hydrology and Salinity of the Anclote River Estuary, Florida 1990), US Filter, Memcor, City of Melbourne (Web-page), AWWA Journal (January 1992, Membrane Processes), Florida Water Resources Journal (September 1993, Advanced Water Treatment), Florida Specifier (Vol.16, No.10 Oct 1994), AWWA (March 1995, Membrane Processes), FDEP, Dr. J. Tabaraje, (Industrial Waste Permitting), FDEP, Ms. J. Richtar, (Deep Well Injection), Diversified Well Drilling, Hudson Pumps, Pinellas County GIS mapping online, Terra Server (Topo Mapping), the City of Tarpon Springs, Engineering Department, the City of Tarpon Springs, Public Services Department, the City of Tarpon Springs, Water Supply Water Wells Department and the City of Tarpon Springs, Wastewater Treatment Plant.

Section 6, Table 6-1
Cost Worksheet

Projected Cost	4 MGD	5 MGD	8 MGD
R.O.Plant	$ 10,873,786.41	$ 13,592,233.01	$ 21,747,572.82
Well Field	$ 625,000.00	$ 775,000.00	$ 1,250,000.00
Pump/Motor	$ 794,642.86	$ 985,357.14	$ 1,589,285.71
piping	$ 1,100,000.00	$ 1,200,000.00	$ 1,680,000.00
Building RO/Admin	$ 2,455,200.00	$ 2,728,000.00	$ 3,751,000.00
Distribution Piping	$ 335,000.00 24"	$ 335,000.00 24"	$ 335,000.00 24"
Concentrate Disposal			
Surface Water	$ 1,100,000.00 Surface water outfall/mixing zone	$ 1,100,000.00 Surface water outfall/mixing zone	$ 1,100,000.00 Surface water outfall/mixing zone
Storage Tanks	$ 550,000.00	$ 550,000.00	$ 1,100,000.00
Building	$ 156,250.00	$ 156,250.00	$ 156,250.00
Pump/Motor	$ 200,000.00	$ 200,000.00	$ 250,000.00
Storage Tanks (RAW/FRESH)	$ 1,575,000.00	$ 2,100,000.00	$ 3,125,000.00
High Service Distibution Pumping Facility	$ 350,000.00	$ 400,000.00	$ 400,000.00
Disinfectant Equipment	$ 150,000.00	$ 150,000.00	$ 200,000.00
Controls	$ 200,000.00	$ 200,000.00	$ 200,000.00
Building	$ 187,500.00	$ 187,500.00	$ 187,500.00
Chlorine Building	$ 156,250.00	$ 156,250.00	$ 156,250.00
Land	$ 1,000,000.00	$ 1,000,000.00	$ 1,000,000.00
Electrical Service	$ 1,103,699.10	$ 1,298,469.53	$ 1,957,551.24
Back up Generation	$ 300,000.00	$ 300,000.00	$ 350,000.00
Test Wells	$ 750,000.00	$ 750,000.00	$ 1,000,000.00
Monitoring Wells @ $10,000.00 ea 2/Prod. Well	$ 500,000.00	$ 620,000.00	$ 1,000,000.00
Estimated Sub Total	$ 24,462,328.36	$ 28,784,059.68	$ 42,535,409.77
10% Contingency	$ 26,908,561.20	$ 31,662,465.65	
Professional Services 15% of total Project Costs	$ 4,036,284.18	$ 4,749,369.85	$ 10,633,852.44
Estimated Total Construction Cost	$ 30,944,845.38	$ 36,411,835.49	$ 53,169,262.21
	$ 30,944,845.38	$ 36,411,835.49	$ 53,169,262.21
GPD	4,000,000	5,000,000	8,000,000
Cost/Gallon	$ 7.74	$ 7.28	$ 6.65

Section 6, Table 6-1
Cost Worksheet

Treatment Facility Cost Projections

TDS/Cl-removal	mg/L	% of Reject		% Finished Water	4 MGD plant size	plant cost @ $2.00/gallon	5 MGD plant size	plant cost @ $2.00/gallon	8 MGD plant size	plant cost @ $2.00/gallon
TDS	3,000	4.29%		95.7%	4.18	$ 8,358,208.96	5.22	$ 10,447,761.19	8.36	$ 16,716,417.91
CL-	1,980	15% Reject		81%	4.96	$ 9,911,504.42	6.19	$ 12,389,380.53	9.91	$ 19,823,008.85
TDS	4,000	5.71%		94.3%	4.24	$ 8,484,848.48	5.30	$ 10,606,060.61	8.48	$ 16,969,696.97
CL-	2,640	15% Reject		79%	5.05	$ 10,090,090.09	6.31	$ 12,612,612.61	10.09	$ 20,180,180.18
TDS	5,000	7.14%		92.9%	4.31	$ 8,615,384.62	5.38	$ 10,769,230.77	8.62	$ 17,230,769.23
CL-	3,300	15% Reject		78%	5.14	$ 10,275,229.36	6.42	$ 12,844,036.70	10.28	$ 20,550,458.72
TDS	6,000	8.57%		91.4%	4.38	$ 8,750,000.00	5.47	$ 10,937,500.00	8.75	$ 17,500,000.00
CL-	3,960	15% Reject		76%	5.23	$ 10,467,289.72	6.54	$ 13,084,112.15	10.47	$ 20,934,579.44
TDS	7,000	10.00%		90.0%	4.44	$ 8,888,888.89	5.56	$ 11,111,111.11	8.89	$ 17,777,777.78
CL-	4,620	15% Reject		75%	5.33	$ 10,666,666.67	6.67	$ 13,333,333.33	10.67	$ 21,333,333.33
TDS	8,000	11.43%		88.6%	4.52	$ 9,032,258.06	5.65	$ 11,290,322.58	9.03	$ 18,064,516.13
CL-	5,280	15% Reject		74%	5.44	$ 10,873,786.41	6.80	$ 13,592,233.01	10.87	$ 21,747,572.82

Well Field cost data

Based on 8,000 TDS
200GPM

10" Case # of wells		Depth 250 ft		total cost
25		$ 25,000.00	ea	$ 625,000.00
31				$ 775,000.00
50				$ 1,250,000.00

Section 6, Table 6-2
Cost Worksheet

Projected Cost	4 MGD		5 MGD		8 MGD	
R.O.Plant	$ 15,657,142.86		$ 19,571,428.57		$ 31,314,285.71	
Well Field	$ 2,160,000.00		$ 2,711,458.33		$ 4,338,333.33	
Pump/Motor	$ 1,722,857.14		$ 2,162,710.81		$ 3,460,337.30	
piping	$ 1,100,000.00		$ 1,200,000.00		$ 1,680,000.00	
Building RO/Admin	$ 2,531,925.00		$ 2,813,250.00		$ 5,333,125.00	
Distribution Piping	$ 335,000.00	24"	$ 335,000.00	24"	$ 335,000.00	24"
Concentrate Disposal						
Surface Water	$ 1,500,000.00	Surface water outfall/mixing zone	$ 1,750,000.00	Surface water outfall/mixing zone	$ 2,000,000.00	Surface water outfall/mixing zone
Storage Tanks	$ 1,100,000.00		$ 1,100,000.00		$ 1,650,000.00	
Building	$ 156,250.00		$ 156,250.00		$ 156,250.00	
Pump/Motor	$ 200,000.00		$ 200,000.00		$ 200,000.00	
Storage Tanks (RAW/FRESH)	$ 2,625,000.00		$ 2,625,000.00		$ 3,125,000.00	
High Service Distibution Pumping Facility	$ 76,000.00		$ 76,000.00		$ 76,000.00	
Disinfectant Equipment	$ 150,000.00		$ 150,000.00		$ 200,000.00	
Controls	$ 200,000.00		$ 200,000.00		$ 200,000.00	
Building	$ 187,500.00		$ 187,500.00		$ 187,500.00	
Chlorine Building	$ 156,250.00		$ 156,250.00		$ 156,250.00	
Land	$ 1,000,000.00		$ 1,000,000.00		$ 1,000,000.00	
Electrical Service	$ 1,158,094.62		$ 1,781,684.03		$ 2,730,694.44	
Back up Genneration	$ 350,000.00		$ 350,000.00		$ 400,000.00	
Exporitory Drilling	$ 750,000.00		$ 750,000.00		$ 1,000,000.00	
Monitoring Wells @ $10,000.00 ea 2/Prod. Well	$ 720,000.00		$ 900,000.00		$ 1,440,000.00	
Sub Sub Total	$ 33,836,019.62		$ 40,176,531.75		$ 60,982,775.79	
Contingency 10%	$ 3,383,601.96		$ 4,017,653.17		$ 6,098,277.58	
Sub Total	$ 37,219,621.58		$ 44,194,184.92		$ 67,081,053.37	
Engineering Cost 15% of total Project Costs	$ 9,304,905.39		$ 11,048,546.23		$ 16,770,263.34	
Estimated Total Construction Cost	$ 43,140,925.01		$ 51,225,077.98		$ 77,753,039.14	
	$ 43,140,925.01		$ 51,225,077.98		$ 77,753,039.14	
GPD	4,000,000		5,000,000		8,000,000	
Construction Cost/Gallon	$ 10.79		$ 10.25		$ 9.72	

Section 6, Table 6-2
Cost Worksheet

Treatment Facilty Cost Projections

TDS/Cl-removal	mg/L	% of Reject		% Finished Water	4 MGD plant size	plant cost @ $2.00/gallon	5 MGD plant size	plant cost @ $2.00/gallon	8 MGD plant size	plant cost @ $2.00/gallon
TDS	12,000	17.14%		82.9%	5.37	$ 10,742,857.14	6.71	$13,428,571.43	10.74	$ 21,485,714.29
CL-	7,920	15%	Reject	68%	6.57	$ 13,142,857.14	8.21	$16,428,571.43	13.14	$ 26,285,714.29
TDS	14,000	20.00%		80.0%	5.60	$ 11,200,000.00	7.00	$14,000,000.00	11.20	$ 22,400,000.00
CL-	9,240	15%	Reject	65%	6.80	$ 13,600,000.00	8.50	$17,000,000.00	13.60	$ 27,200,000.00
TDS	16,000	22.86%		77.1%	5.83	$ 11,657,142.86	7.29	$14,571,428.57	11.66	$ 23,314,285.71
CL-	10,560	15%	Reject	62%	7.03	$ 14,057,142.86	8.79	$17,571,428.57	14.06	$ 28,114,285.71
TDS	18,000	25.71%		74.3%	6.06	$ 12,114,285.71	7.57	$15,142,857.14	12.11	$ 24,228,571.43
CL-	11,880	15%	Reject	59%	7.26	$ 14,514,285.71	9.07	$18,142,857.14	14.51	$ 29,028,571.43
TDS	20,000	28.57%		71.4%	6.29	$ 12,571,428.57	7.86	$15,714,285.71	12.57	$ 25,142,857.14
CL-	13,200	15%	Reject	56%	7.49	$ 14,971,428.57	9.36	$18,714,285.71	14.97	$ 29,942,857.14
TDS	23,000	32.86%		67.1%	6.63	$ 13,257,142.86	8.29	$16,571,428.57	13.26	$ 26,514,285.71
CL-	15,180	15%	Reject	52%	7.83	$ 15,657,142.86	9.79	$19,571,428.57	15.66	$ 31,314,285.71

Well Field Cost data

Based on 23,000 TDS
200GPM

12" Case # of wells		Depth		total cost
		600	ft	
36		$ 60,000.00	ea	$2,160,000.00
45				$2,711,458.33
72				$4,338,333.33

Section 6, Table 6-3
Cost Worksheet

Projected Cost	4 MGD		5 MGD		8 MGD	
R.O.Plant	$ 20,700,000.00		$ 25,875,000.00		$ 41,400,000.00	
Intake Structure						
Pump/Motor	$ 849,722.22		$ 1,062,152.78		$ 1,699,444.44	
piping	$ 30,000,000.00		$ 30,000,000.00		$ 45,000,000.00	
Building RO/Admin	$ 3,118,500.00		$ 3,465,000.00		$ 6,750,000.00	
Distribution Piping	$ 335,000.00	24"	$ 335,000.00	24"	$ 335,000.00	24"
Concentrate Disposal						
		Outfall/mixing		Outfall/mixing		Outfall/mixing
Surface Water	$ 2,000,000.00	zone	$ 2,000,000.00	zone	$ 2,000,000.00	zone
Storage Tanks	$ 1,500,000.00		$ 1,750,000.00		$ 2,000,000.00	
Building	$ 156,250.00		$ 156,250.00		$ 156,250.00	
Pump/Motor	$ 250,000.00		$ 250,000.00		$ 250,000.00	
Storage Tanks						
(RAW/FRESH)	$ 1,732,500.00		$ 2,625,000.00		$ 3,125,000.00	
High Service						
Distibution Pumping						
Facility	$ 76,000.00		$ 76,000.00		$ 76,000.00	
Disinfectant						
Equipment	$ 150,000.00		$ 150,000.00		$ 200,000.00	
Controls	$ 200,000.00		$ 200,000.00		$ 200,000.00	
Building	$ 187,500.00		$ 187,500.00		$ 187,500.00	
Chlorine Building	$ 156,250.00		$ 156,250.00		$ 156,250.00	
Land	$ 1,000,000.00		$ 1,000,000.00		$ 1,000,000.00	
Electrical Service	$ 1,000,000.00		$ 1,000,000.00		$ 1,000,000.00	
Back up						
Genneration	$ 500,000.00		$ 500,000.00		$ 700,000.00	
	$ 500,000.00		$ 500,000.00		$ 500,000.00	
	$ 210,000.00		$ 210,000.00		$ 330,000.00	
Sub Sub Total	$ 64,621,722.22		$ 71,498,152.78		$ 107,065,444.44	
Contingency 10%	$ 6,462,172.22		$ 7,149,815.28		$ 10,706,544.44	
Sub Total	$ 71,083,894.44		$ 78,647,968.06		$ 117,771,988.89	
Engineering Cost						
15% of total Project						
Costs	$ 10,662,584.17		$ 11,797,195.21		$ 17,665,798.33	
Estimated Total						
Construction Cost	$ 75,284,306.39		$ 83,295,347.99		$ 124,731,242.78	
GPD	4,000,000		5,000,000		8,000,000	
Construction						
Cost/Gallon	$ 18.82		$ 16.66		$ 15.59	

Section 6, Table 6-3
Cost Worksheet

Treatment Facilty Cost Projections										
TDS/Cl- removal	mg/L	% of Reject		% Finished Water	4 MGD plant size	plant cost @ $2.25/gallon	5 MGD plant size	plant cost @ $2.25/gallon	8 MGD plant size	plant cost @ $2.25/gallon
TDS	23,000	32.86%		67.1%	6.63	$ 14,914,285.71	8.29	$ 18,642,857.14	13.26	$ 29,828,571.43
CL-	15,180	15%	Reject	52%	7.83	$ 17,614,285.71	9.79	$ 22,017,857.14	15.66	$ 35,228,571.43
TDS	25,000	35.71%		64.3%	6.86	$ 15,428,571.43	8.57	$ 19,285,714.29	13.71	$ 30,857,142.86
CL-	16,500	15%	Reject	49%	8.06	$ 18,128,571.43	10.07	$ 22,660,714.29	16.11	$ 36,257,142.86
TDS	28,000	40.00%		60.0%	7.20	$ 16,200,000.00	9.00	$ 20,250,000.00	14.40	$ 32,400,000.00
CL-	18,480	15%	Reject	45%	8.40	$ 18,900,000.00	10.50	$ 23,625,000.00	16.80	$ 37,800,000.00
TDS	30,000	42.86%		57.1%	7.43	$ 16,714,285.71	9.29	$ 20,892,857.14	14.86	$ 33,428,571.43
CL-	19,800	15%	Reject	42%	8.63	$ 19,414,285.71	10.79	$ 24,267,857.14	17.26	$ 38,828,571.43
TDS	32,000	45.71%		54.3%	7.66	$ 17,228,571.43	9.57	$ 21,535,714.29	15.31	$ 34,457,142.86
CL-	21,120	15%	Reject	39%	8.86	$ 19,928,571.43	11.07	$ 24,910,714.29	17.71	$ 39,857,142.86
TDS	35,000	50.00%		50.0%	8.00	$ 18,000,000.00	10.00	$ 22,500,000.00	16.00	$ 36,000,000.00
CL-	23,100	15%	Reject	35%	9.20	$ 20,700,000.00	11.50	$ 25,875,000.00	18.40	$ 41,400,000.00

Intake Type Structure Calculations number pumps required based upon 750 GPM

MGD		24 HRS		
9,200,000.00	4MGD	9,583.33	GPM	12.78
11,500,000.00	5 MGD	11,979.17	GPM	15.97
18,400,000.00	8MGD	19,166.67	GPM	25.56

Section 6, Table 6-4
Cost Worksheet

Projected Cost	4 MGD		5 MGD		8 MGD	
R.O.Plant	$ 20,700,000.00		$ 25,875,000.00		$ 41,400,000.00	
Well Field	$ 3,570,000.00		$ 4,514,149.31		$ 7,222,638.89	
Pump/Motor	$ 2,690,000.00		$ 3,401,417.82		$ 5,442,268.52	
piping	$ 1,250,000.00		$ 1,437,500.00		$ 2,012,500.00	
Building RO/Admin	$ 3,123,682.88		$ 3,470,758.75		$ 6,764,562.40	
Distribution Piping	$ 335,000.00	24"	$ 335,000.00	24"	$ 335,000.00	24"
Concentrate Disposal						
Surface Water	$ 1,100,000.00	Surface water outfall/mixing zone	$ 1,100,000.00	Surface water outfall/mixing zone	$ 1,100,000.00	Surface water outfall/mixing zone
Storage Tanks	$ 1,485,000.00		$ 2,250,000.00		$ 1,500,000.00	
Building	$ 156,250.00		$ 156,250.00		$ 156,250.00	
Pump/Motor	$ 250,000.00		$ 250,000.00		$ 250,000.00	
Storage Tanks (RAW/FRESH)	$ 1,732,500.00		$ 2,625,000.00		$ 3,125,000.00	
High Service Distibution Pumping						
Facility	$ 76,000.00		$ 76,000.00		$ 76,000.00	
Equipment	$ 150,000.00		$ 150,000.00		$ 200,000.00	
Controls	$ 200,000.00		$ 200,000.00		$ 200,000.00	
Building	$ 187,500.00		$ 187,500.00		$ 187,500.00	
Chlorine Building	$ 156,250.00		$ 156,250.00		$ 156,250.00	
Land	$ 1,000,000.00		$ 1,000,000.00		$ 1,000,000.00	
Electrical Service	$ 1,439,178.24		$ 1,439,178.24		$ 2,182,685.19	
Back up Genneration	$ 500,000.00		$ 500,000.00		$ 750,000.00	
Exporitory Drilling	$ 1,000,000.00		$ 1,000,000.00		$ 1,000,000.00	
Monitoring Wells @ $10,000.00 ea 2/Prod. Well	$ 560,000.00		$ 708,101.85		$ 1,132,962.96	
Sub Sub Total	$ 41,661,361.12		$ 50,832,105.97		$ 76,193,617.96	
Contingency 10%	$ 4,166,136.11		$ 5,083,210.60		$ 7,619,361.80	
Sub Total	$ 45,827,497.23		$ 55,915,316.57		$ 83,812,979.75	
Engineering Cost 15% of total Project Costs	$ 6,874,124.58		$ 8,387,297.49		$ 12,571,946.96	
Estimated Total Construction Cost	$ 48,535,485.70		$ 59,219,403.46		$ 88,765,564.92	
GPD	4,000,000		5,000,000		8,000,000	
Construction	$ 12.13		$ 11.84		$ 11.10	

Section 6, Table 6-4
Cost Worksheet

Treatment Facilty Cost Projections

TDS/Cl-removal	mg/L	% of Reject	% Finished Water	4 MGD plant size	plant cost @ $2.25/gallon	5 MGD plant size	plant cost @ $2.25/gallon	8 MGD plant size	plant cost @ $2.25/gallon
TDS	23,000	32.86%	67.1%	6.63	$ 14,914,285.71	8.29	$ 18,642,857.14	13.26	$ 29,828,571.43
CL-	15,180	15% Reject	52%	7.83	$ 17,614,285.71	9.79	$ 22,017,857.14	15.66	$ 35,228,571.43
TDS	25,000	35.71%	64.3%	6.86	$ 15,428,571.43	8.57	$ 19,285,714.29	13.71	$ 30,857,142.86
CL-	16,500	15% Reject	49%	8.06	$ 18,128,571.43	10.07	$ 22,660,714.29	16.11	$ 36,257,142.86
TDS	28,000	40.00%	60.0%	7.20	$ 16,200,000.00	9.00	$ 20,250,000.00	14.40	$ 32,400,000.00
CL-	18,480	15% Reject	45%	8.40	$ 18,900,000.00	10.50	$ 23,625,000.00	16.80	$ 37,800,000.00
TDS	30,000	42.86%	57.1%	7.43	$ 16,714,285.71	9.29	$ 20,892,857.14	14.86	$ 33,428,571.43
CL-	19,800	15% Reject	42%	8.63	$ 19,414,285.71	10.79	$ 24,267,857.14	17.26	$ 38,828,571.43
TDS	32,000	45.71%	54.3%	7.66	$ 17,228,571.43	9.57	$ 21,535,714.29	15.31	$ 34,457,142.86
CL-	21,120	15% Reject	39%	8.86	$ 19,928,571.43	11.07	$ 24,910,714.29	17.71	$ 39,857,142.86
TDS	35,000	50.00%	50.0%	8.00	$ 18,000,000.00	10.00	$ 22,500,000.00	16.00	$ 36,000,000.00
CL-	23,100	15% Reject	35%	9.20	$ 20,700,000.00	11.50	$ 25,875,000.00	18.40	$ 41,400,000.00

Based on 35,000 TDS
300GPM

14" Case # of wells		Depth 850	ft	total cost
28		$ 127,500.00	ea	$ 3,570,000.00
35				$ 4,514,149.31
57				$ 7,222,638.89